The Monthly Review

Published by the AMERICAN ELECTROPLATERS' SOCIETY

SEPTEMBER 1938

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The Monthly Review

Published by the AMERICAN ELECTROPLATERS' SOCIETY

A Society for the Advancement of the Science of Electroplating

SEPTEMBER 1938

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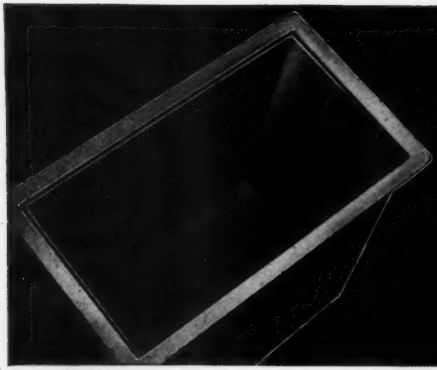

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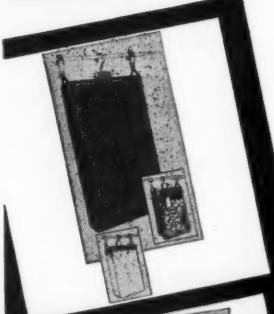

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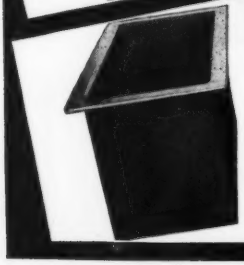

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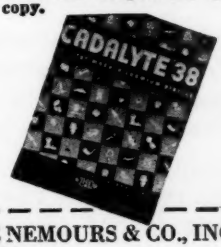

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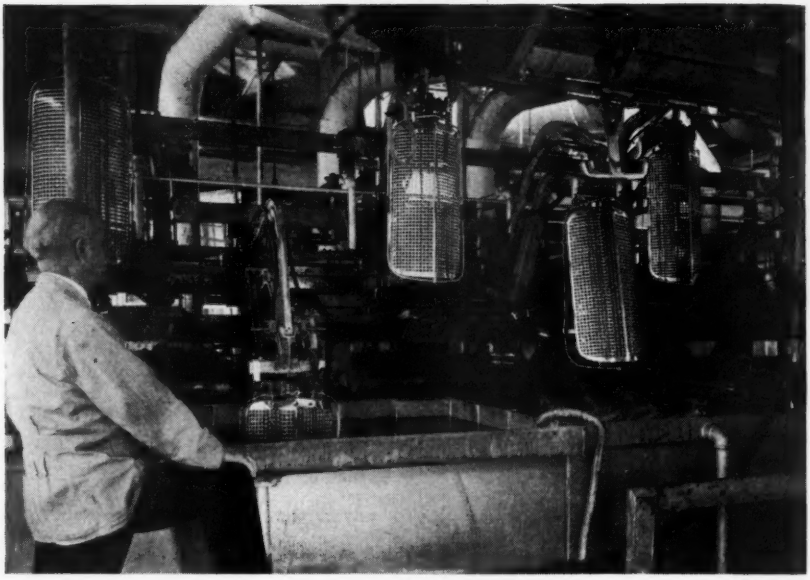

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The MONTHLY REVIEW

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VOL. XXV SEPTEMBER 1938 NO. 9

Editorial

The 1939 Convention of the American Electroplaters Society will be held at Asbury Park, N. J., June 19-22 under the direction of the Newark Branch, with Past Supreme President, Horace H. Smith as General Chairman.

Having had the pleasure of visiting this famous New Jersey summer resort recently with Mr. Smith, we can give hearty approval to all that has been said regarding it as a convention city. We are stressing particularly the idea of making next year's annual meeting a family affair. This is an ideal place for father, mother, and the children to have a real vacation, ending the week with a trip to the World's Fair in New York, about sixty miles distant. In a leaflet issued by the Asbury Park Boardwalk Information Bureau, we received the following details:

Asbury Park, where sun, sky, surf, and sport meet on the road to health and recreation, is ideally located on the North Jersey Coast only 60 miles south of New York City and 70 miles northeast of Philadelphia. The world's finest and most modern super highways lead to and from Asbury Park and take you swiftly and safely to your destination. In 1939, Asbury Park vacationists may visit the New York World's Fair. It is only a two hour trip by train, bus, or motorcar.

It is not just by accident that more than three-quarters of a million people cross state boundaries every business day in the year to live in New Jersey; and it is not surprising that over 300,000 people come to Asbury Park in the peak of the season.

Here are to be found million dollar estates, modern city apartments, modest family cottages, and shady woodland homes, all in addition to the 200 hotels.

Both the Central Railroad of New Jersey and the Pennsylvania Railroad serve Asbury Park with many daily trains, and the commuter may conveniently journey to the metropolitan areas.

Asbury Park is a heaven for the youngsters and for mothers and fathers worried in the search for safe play places for their toddlers and older boys and girls.

On a clean beach, in soft, white sand, they dig their forts and build their houses; they wade in the surf under watchful eyes, shoot the shoots, slide the slides, swing and romp, ride the ponies, whirl around in the toy cars until, tired and hungry at the end of the day, with keen appetites satisfied, they sleep soundly through the long cool nights.

Asbury Park has long been famous as a family resort. Discriminating fathers pick it as the summer home for their wives and children. The City Health Department enforces a strict sanitary code and the infant mortality rate is one of the lowest in the United States.

Asbury Park offers a wealth of entertainment to fill your leisure hours. The palatial beach buildings, magnificent theaters and amusement places feature a variety of entertainment at its best.

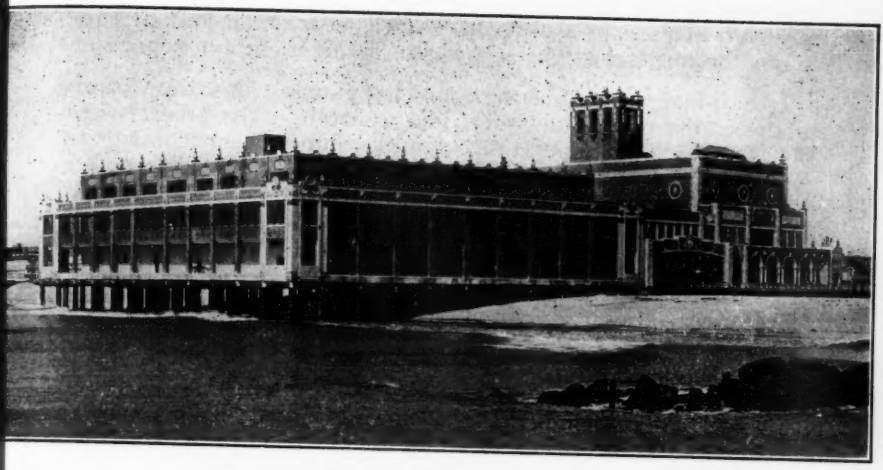
Situated on and near the boardwalk, Asbury Park offers six of the finest show houses to be found anywhere. Pre-released pictures and legitimate productions are presented the year round.

At the mighty Convention Hall on the Boardwalk numerous activities take place throughout the year. Each day there is an organ recital in the $5,000,000 hall by G. Howard Scott, municipal organist.

If you have the urge to knock the stuffing out of that little white golf ball, or if you are just a novice starting out on your first season of trudging the links through the bright summer days, Asbury Park and the immediate vicinity provide a variety of courses, hazards and facilities to cater to every taste and pocketbook.

Asbury Park offers the vacationer 20 of the finest Shuffle Board Courts in the country. The courts accommodate 80 players at one time and are located on the Boardwalk between Eighth Avenue and the Marine Grill, facing Deal Lake. Free instruction is offered to all new players and friends of players are welcome at all times and may watch the games from benches.

Young and old at the Jersey Shore have become bicycle conscious. Thousands of people have discovered something appealing about the bike which was not evident before. The low cost of cycling is one of the most appealing features. Debutantes and millionaires ride, but the sport is entirely within the



CONVENTION HALL

BEACH AND BOARDWALK CROWDS

compass of the lightest pocketbook. Maybe it's just a fad, maybe it attracts as a pleasant way to get fresh air and exercise; maybe no one knows the reason, but riding is extremely popular.

It's all here for your entertainment; games, rides, the wizards of the cards; or if you prefer, just a stroll on the breeze-swept Boardwalk. For generations families have been coming to Asbury Park, appreciative of the fact that they will be free from the gaudy blare of the usual resort, undisturbed in their hours of rest and safe and happy in their sports and diversions.

HOTELS

Accommodations in Asbury Park are provided by more than 200 hotels. For those desiring less expensive accommodations rooming houses offer a wide variety of price and service. New and attractive cottages and apartments are available for those desiring greater privacy.

NEARBY POINTS OF INTEREST

Sea Girt Military Camp — Six miles south of Asbury Park at Sea Girt, the Summer Capital of New Jersey. One of the finest camp grounds and rifle ranges in the country.

Shark River — Two and one-half miles south of City. Famous for crabbing and clamming.

Barnegat Bay — Forty-six miles south of City. Famous fishing and duck shooting grounds.

Shadow Lawn — Four miles north of City. Former summer home of President Wilson.

Rumson Road — Twelve miles north of City. The "Millionaire's Boulevard."

Sandy Hook — Fifteen miles north of City. Government proving ground for heavy artillery. A principal defense of New York City.

Highland Lights — Fourteen miles north of City. Famous twin lighthouse on the Highlands of Navesink, the highest point of land on the Atlantic Coast.

More complete information regarding hotel rates and rooming house prices per day and week will be supplied in a future issue of the REVIEW. In order to allay the fears of any who may have heard about the Jersey "skeeters", we might add that the leaflet from which we quoted states "there are no mosquitoes in Asbury Park."

pH *and* Electrode Reactions

By E. H. LYONS, JR.
Meaker Company, Chicago

Read at Chicago Banquet Jan. 15, 1938

THE use of pH measurements has spread so rapidly that many who are using them have very vague ideas as to their significance. Of course, we all know that pH is connected with acidity: we add acid to a solution, and the pH goes down. But just how does this happen?

First, what do we mean by an acid? We mean one of a group of chemicals that turn litmus red, have a sour taste, and attack many metals and many other substances. The chemists tell us that all acids contain hydrogen—not just any old hydrogen, but a special kind of hydrogen that is very loosely attached. This hydrogen is very readily split off from the acid and replaced by metal atoms. It splits off so easily that when acid is just mixed with water, the hydrogen splits off to more or less degree and goes wandering around by itself in the water.

A special name has been given to hydrogen when it goes wandering around like this: it is called an *ion*, which is the old Greek word for "wanderer".

Wandering hydrogen, or hydrogen ions, is the cause of all acid characteristics. Acid tastes sour because hydrogen ions wander on to our tongues; it burns the skin because hydrogen ions attack skin; it turns litmus red because of the hydrogen ions; and it attacks metal because hydrogen ions act on metal.

If we put an anode and cathode into an acid solution and turn on the current, we will always find hydrogen gas bubbling off at the cathode, even though other processes such as plating are also occurring there. If the solution contains nothing but acid, very large quantities of hydrogen escape at the cathode, and we sometimes take advantage of this fact in what we call "electro-pickling".

Since hydrogen ions are attracted to the cathode, which is negative, the hydrogen ions must be positive, for unlike charges are attracted, and like charges repelled. Likewise, the remainder of the acid molecule, after the hydrogen is split off, must be negative, to keep the whole molecule neutral. Sometimes this negative part of the molecule is discharged at the anode, which is positive.

So a molecule of acid consists of two parts: a positive hydrogen ion, which is responsible for the "acidness", and a counterbalancing negative part. Thus, sulfuric acid is positive hydrogen and negative sulfate; muriatic acid is positive hydrogen and negative chloride; boric acid is positive hydrogen and negative borate. The two parts hold together because of the attraction between the two electric charges.

The force between two electric charges—attraction if the charges are unlike, as in a molecule, and repulsion if they are similar—this force is strongest if there is nothing in its way, if there is nothing between the two charges. That is only true if the two charges are in a vacuum. If we put air between them, the force is slightly weakened. Other substances weaken it still more, and one of the greatest weakeners is water. When water is put between the two charges, the force is reduced 81 times—it is only 1/81st as strong as in a vacuum or in air. This 81 is called the "dielectric constant" of water.

Take a molecule of muriatic acid. It consists of two parts, hydrogen and chloride, holding together by the electric attraction between them. If the molecule is put in water, though, the electric attraction is cut to 81 times less, and it is no longer strong enough to hold the molecule together. The hydrogen ion, being light and active, goes wandering off; and this wandering hydrogen ion is what makes the solution act like an acid.

The same thing happens with sulfuric and other acids. A solution of muriatic acid containing 1 g./l. of hydrogen and a solution of sulfuric acid containing 1 g./l. of hydrogen iron are just alike, so far as being acid goes. One is just as sour as the other; one will neutralize just as much alkali as the other. There are secondary effects due to the negative parts of the acid,

which make the solutions slightly different but the main effects, due to the hydrogen ions, are the same for all acids.

Take boric acid. It consists of positive hydrogen and negative borate, holding together by electrical attraction. This attraction is so strong that even when it is cut 81 times by water, it still holds the hydrogen very tightly. Therefore, there are very few hydrogen ions in a boric acid solution. There are not even enough to make the solution taste sour; not enough to turn litmus red; not enough to attack metals except very, very slowly.

That is why we call boric acid a weak acid. There are many weak acids—acetic, carbonic, sulfurous, tartaric, citric, etc., and they are weak because they hold on to their hydrogen, to more or less degree, even in solution. A weak acid is weak because it has a strong electric attraction; a strong acid is strong because its electric attraction is small.

Acidity, or acid strength, doesn't depend on the concentration. A solution of 1 oz/gal. sulfuric acid and 1.2 oz/gal. of boric acid have equal amounts of hydrogen in them. They will neutralize the same amounts of alkali, and dissolve the same amounts of metal, although it may take the boric acid several years to do it. But the sulfuric acid solution is strong; it tastes very sour, turns litmus red, attacks metals vigorously. The boric acid is weak; it attacks metals slowly, doesn't taste sour, doesn't act on litmus.

We have never had a measure for this acidity. Our old chemical methods would tell us how much hydrogen was available, but not how much hydrogen ion was present. If you handed those two solutions of sulfuric acid and boric acid to a chemist, he would say one has just as much acid in it as the other, but you would just have to know that sulphuric acid was strong and could burn you, while the boric acid is so weak that you can put it in your eye for an eyewash.

The need for determining the intensity of an acid was felt very strongly by electroplaters. For example, a nickel solution has both boric and sulfuric acids in it, and when you add a pint of sulfuric acid, it has quite a different effect on the acidity from

an equivalent amount of boric acid. Sometimes you need only a little sulfuric acid, sometimes a larger amount, and chemical analysis couldn't tell which.

So ways are invented to measure the hydrogen ion concentration, which is what we really want to know. It is especially important when the solution has only a very small amount of acid in it; that is, when it is nearly neutral; because many electroplating baths, and most biological processes, require nearly neutral solutions.

Using these new methods, the hydrogen ion concentration is measured; and in nearly neutral solutions, the small fractions expressing it are very inconvenient to use. For example, we would say a nickel solution with a hydrogen ion concentration of 38 billionths ounces per gallon would give peeling, unless we add enough acid to raise the hydrogen ion concentration to 50 hundred millionths ounces per gallon. But if we add too much acid, and raise the hydrogen concentration to one ten-millionth, the color of the nickel will be very poor and dull.

How much is 38 billionths? It is .000,000,038. That is a long number to write, and a longer one to figure out. Scientists have a better way of writing it. They put it, 38×10^{-9}. That -9 means we should write down 38., then move the decimal point nine places to the left, which gives us .000,000,038. If the exponent of 10 had been $+9$, we would have moved the decimal point to the right; but actually we'll only have to deal with small fractions, so the exponents will always be negative, and we'll always move the decimal point to the left.

This is a simplification, but it is still unhandy. If we could put the 38 into the exponent too, then all we'd have to talk about would be the exponent. It can be found mathematically that if we write $10^{-7.4}$, we have included the 38 in the exponent. That is,

$$.000,000,038 = 38 \times 10^{-9} = 10^{-7.4}.$$

The -7.4 is the logarithm of the number .000,000,038. All we have to do to find it is to look the number up in a table of logarithms. Then if we know how to use the table, we can get the

logarithm or exponent. It can also be calculated by methods given in books on mathematics.

Now we can say, this nickel solution has a hydrogen ion concentration of 38 billionths oz/gal., or 38 x 10^{-9} oz/gal., or $10^{-7.4}$ oz/gal., or simply, the logarithm is -7.4. Because we are platers, I have been talking about ounces per gallon. But we are talking over the chemists' language in pH, and a chemist never talks about ounces per gallon; he uses grams per liter.

We can change over easily: .000,000,038 oz/gal. is .000,000,28 g./l., or 28 x 10^{-8} g./l., or $10^{-6.5}$ g./l., or the logarithm is -6.5.

Instead of saying, "the logarithm of the hydrogen ion concentration is minus 6.5", we have a symbol for all this: the *pH* is 6.5. pH stands for the logarithm of hydrogen ion concentration, including the minus sign.

$$pH = - \log C_H^+ \text{ or } 10^{-pH} = C_H^+$$

You can think of pH as meaning the power, *p*, to which ten has to be raised to give the *H* concentration. Concentration has to be expressed in grams per liter, or, more correctly, in mols per liter, which happens to be the same thing for hydrogen.

By using logarithm tables, any one can convert from pH to hydrogen ion concentration to actual acid concentration, and back again. For example, suppose a dilute muriatic acid solution has a pH of 2.3. What is its concentration?

We look in the logarithm tables, and find that -2.3 is the logarithm of .0051; therefore, the hydrogen ion concentration is .0051 g./l., and we multiply by 0.134 and find the hydrogen ion concentration is .00068 oz/gal. Since hydrogen is 2.7% of pure muriatic acid, the concentration of muriatic acid is .00068/.027, or .025 oz./gal. But this is pure muriatic acid; the concentrated acid we buy is about 36% acid, so the solution contains .025/0.36 or .069 oz/gal. of concentrated muriatic. This method is only good for strong acids; weak acids require a more complex calculation.

Taking the minus sign into the definition of pH is the reason

pH runs exactly opposite to the acid concentration. For instance, a pH of 2 means more acid than a pH of 4; but what really is meant is that an exponent of -2 means more acid than an exponent of -4, and of course, -2 is a larger number than -4.

Using the logarithm isn't just a complication however; it gives a scale of pH which is very sensitive just where we need that sensitivity; and where it is less sensitive, the old-fashioned chemical titration is satisfactory. Around the neutral point, pH is a much more delicate way of studying the acid strength; below a pH of 1, the acid-content determined by titration is more accurate.

Also, the use of the logarithm rests on a theoretical basis which appears to be pretty sound, particularly in view of the electrometric method of measuring pH.

Unfortunately, after this beautiful development of this new, powerful tool in studying solutions, and its introduction into practical affairs, the scientists have now discovered that they were all "wet"; what they thought was actually hydrogen ion concentration wasn't really that at all. It isn't even the apparent or effective hydrogen ion concentration, called the *Activity*. Errors, uncertainties, and other effects come in which make it hopeless to ever expect to get the true hydrogen ion concentration. Therefore pH doesn't mean anything.

On the other hand, we practical men are using pH every day: we know that we are measuring something that helps us run our solutions better. Even the scientists admit that pH comes somewhere near the hydrogen ion concentration. So as we use it daily, let us think of pH as being somewhere near, but not exactly, the hydrogen ion concentration.

And if your boss asks you, "What is pH anyway?", you can truly answer, "Nobody knows".

Now, I have spoken of the neutral point, which implies that there is another side to the pH scale; and you all know that even alkaline solutions have a pH. How can this be, if pH measures acidity? Can there be acid existing in an alkaline solution?

The answer to this is, water itself is a source of hydrogen ions. Therefore, it must be an acid. And when the hydrogen ion is split off, it leaves an OH^-, or hydroxyl ion:

$$H_2O \text{ or } HOH = H^+ + OH^-$$

The OH^- ion is just as characteristic of an alkali as the hydrogen ion is of an acid. Therefore pure water is both an acid and an alkali; it produces hydrogen ions and hydroxyl ions in equal amounts, so that water is just as much alkaline as acid; that is, it is neutral. The binding forces in water are such that the concentration of hydrogen ions, and also of hydroxyl ions, is 10^{-7} g./l.; that is, the pH is 7.

Precise measurements show that the product of the hydrogen ion concentration and the hydroxyl ion concentration is always the same in water. We can calculate what it is; for pure water, cH + is .000,000,1; therefore c_{OH^-} is also .000,000,1 (mols/liter), and the product is .000,000,000,000,001, or 10^{-14}. This is true only for room temperature.

Even in acid solutions, not all of the hydrogen ion comes from the acid; a very small part of it comes from the water. And for every hydrogen ion from the water, there is a hydroxyl ion free too. Then in the muriatic acid solution we figured, with a pH of 2.3, the hydrogen ion concentration is $10^{-2.3}$, and the hydroxyl ion concentration must be $10^{-11.7}$ mols/liter, so that the product will be 10^{-14}.

Suppose instead of a muriatic acid solution, we had a caustic soda solution with a concentration of $10^{-2.3}$ mols/liter of hydroxyl ions. Then the hydrogen ion concentration would be $10^{-11.7}$, and the pH would be 11.7. Such a solution would contain about 0.2 g./l. caustic soda, or about 0.027 oz./gal. caustic soda. This is calculated much as for the acid.

If we add more caustic to this solution, the hydroxyl ion concentration will increase, and therefore the hydrogen ion concentration will decrease, to keep the product 10^{-14}. If we raise the hydroxyl ion concentration ten times, to $10^{-1.3}$, then the hydrogen ion concentration will go to one-tenth, or $10^{-12.7}$ and the

pH will be 12.7. This will require ten times as much caustic, or about 0.27 oz./gal.

Therefore alkaline solutions have a pH of more than 7; acid solutions have a pH below 7.

What happens to these hydrogen ions and hydroxyl ions at the anodes and cathodes? The effects are complicated, and not too well understood, but we can suggest some things.

At the cathode, of course, the big effect is the plating out of the metal. But there is always some hydrogen liberated, and this comes from hydrogen ions:

$$\text{Electron} + H+ = H\ (\text{gas})$$
$$C_{H+} \times C_{OH-} = 10^{-14}$$

This means that hydrogen ions are consumed at the cathode. Therefore the pH is lowered. As the product of 10^{-14} must be preserved, water liberates hydroxyl ions until the product comes up to 10^{-14}. These hydroxyl ions around the cathode are a film of alkalinity. It is much more than just a consumption of hydrogen ions from the acid, because the pH can easily cross the neutral point of 7, and become quite high—10–12.

At the anode, hydroxyl ions may be consumed, besides the anodic solution of the anode metal. If hydroxyl ions are consumed, oxygen gas bubbles off:

$$\text{Electron} + OH^- + OH^- = O\ (\text{Gas}) + H_2O$$

And as the hydroxyl ions are consumed, the water has to provide additional hydrogen ions to keep the product 10^{-14}. So the pH drops at the anode, and there may be a region of solution there which is quite acidic.

In fact, if we take a nearly neutral solution of sodium sulfate, and put a pair of insoluble anodes in it, and dissolve litmus in it, you can see a blue region around the cathode, and a red region around the anode, showing these alkaline and acid films. This is only true while current is passing.

What does this mean to the electroplater? Well, in plating

nickel, when the nickel enters the alkaline film, if it is sufficiently alkaline the nickel will precipitate as nickel hydroxide:

$$Ni^{++} + 2OH^{-} = Ni(OH)_2 \text{ (ppt)}$$

and this nickel hydroxide can get caught in the nickel deposit and cause a brittle, peeling deposit. To overcome this, we add acid to the solution and keep the cathode film from being quite so acid.

It is quite likely that the function of boric acid in a nickel solution is to keep the cathode film from becoming too alkaline. I told you that boric acid hangs on to its hydrogen very tightly, but there is one thing that holds it even more tightly, namely hydroxyl ion. When hydroxyl ion holds on to hydrogen ion, it forms water:

$$H^{+} + OH^{-} = HOH \text{ or } H_2O$$

And the tendency to form water is one of the strongest in chemistry. Therefore boric acid will give up its hydrogen ion to a hydroxyl:

$$HBO_2 + OH^{-} = BO_2^{-} + HOH$$

Then in your nickel solution, as soon as a hydroxyl is formed it is grabbed up by a boric acid molecule, and the film doesn't become so alkaline; its pH remains low. This effect of boric acid can readly be seen in the sodium sulphate-litmus solution I mentioned.

Ammonium ion is another ion which will regulate the pH in the cathode film. Sal ammoniac, and ammonium sulfate both liberate ammonium ions in solution, and they react with hydroxyl ions, thus:

$$NH_4^{+} + OH^{-} = NH_4OH$$

In solutions which contain other weak acids, such as citric, or the tartaric acid formed from Rochelle salts, these weak acids act just as boric acid does.

On the anode side, the acid film sometimes has important effects. Thus, in alkaline tin solutions, it is important to keep the tin going into solution in the stannic condition, and not in

the stannous; and it can be shown that the formation of stannic ions is favored by a film of low pH, or at least by a precipitate caused by such a film. That is why tin anodes should be "polarized" by a high current density before being used. In fairness, however, it should be pointed out that other explanations are quite as likely.

The alkaline film prevents certain metals from being deposited. Dr. Fink has experimented with the effect of removing this alkaline film mechanically. He plated on a disc-shaped cathode rotating so fast that the alkaline film was torn off as fast as it was formed. Under these conditions, it is possible to plate aluminum and several other metals which cannot ordinarily be plated out of a water solution.

In commercial electroplating we cannot reach the high speeds which Dr. Fink used, but the agitation, especially from a moving cathode, does remove a little of the alkaline film, and accounts in part for the better quality of plating which is usually obtained.

In alloy plating, such as nickel-cobalt, brass, etc., it is probable that the alkaline film at the cathode has a profound influence on the ratios in which the two metals are deposited, and therefore on the composition of the resulting plate. Recent research has shown that the composition depends sharply on the pH, especially in the case of brass.

Any mechanism which is suggested to explain how metal is plated—how it moves out of the solution, picks up its electrons from the cathode, and then crystallizes on the cathode surface, must take into account this cathode film. Such a mechanism has been suggested by quantum mechanics, but this is considerably more complicated than pH and has no experimental verification as yet.

At any cathode, there are two kinds of ions which can be plated out: the metal ions, and the hydrogen ions. Conditions at the cathode will determine how much of each will be plated. At the anode, hydroxyl ions can always plate out oxygen, and conditions will control this also.

I hope that this discussion has given some insight into the significance of pH, and its importance in plating solutions.

Metallurgy *of* Galvanizing*

HOT-DIP GALVANIZED COATINGS

By W. M. PEIRCE
The New Jersey Zinc Company

*** From a paper presented before Annual Meeting, American Zinc Institute, Inc., St. Louis, Mo.**

EDUCATION has taught the consumer that the life of galvanized iron depends almost entirely upon the thickness of the zinc coating. The logical outcome of this knowledge is the beginning of a demand for coatings which are both heavy and adherent. The producer has realized that light coatings of short life open the door to competition from non-metallic materials and that it is difficult to restrict the use of light adherent coatings to those few fields for which they may be adequate. The problem, therefore, becomes one of increasing the weight of coating without losing adherence and without a prohibitive increase in cost.

This problem has been approached by electrolytic methods which have attracted a great deal of attention in recent years. Important results have been achieved and further progress in this field can undoubtedly be expected. The spray methods are becoming of much interest in the fields where the other methods are not applicable. However, this article will be limited to the hot dip process.

HOT-DIP GALVANIZING

The problems of hot galvanizing are neither exclusively problems in steel metallurgy nor in zinc metallurgy but a combination of the two. Because the product is primarily steel, because it must be manufactured in a steel plant and marketed as steel, the development work necessary to a solution of the problems will be and is being done in steel plants and laboratories. There are elements of the problem, however, on which it should be possible to derive useful information from the field of zinc metallurgy.

The adherence of a zinc coating on steel has been quite clearly demonstrated to be influenced, first, by the character of the iron-zinc alloy layer or layers which form during hot dip galvanizing,

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and second, by the ductility or toughness of the outer layer of zinc. It must be borne in mind that the structure of this zinc layer is essentially a cast structure and has none of the ductility conferred by mechanical working of the structure.

The character of the alloy layer is dependent most of all on the composition of the steel base and the physical condition of the steel surface; that is, whether the surface is rough or smooth, or whether there is a coating of sponge iron remaining upon it from the pickling operation. On steel of any composition, the alloy layer may be reduced to a comparatively thin and dense appearing band, if the steel surface is clean and smooth when it enters the zinc bath. This may be brought about, for example, by galvanizing promptly after rolling, so that only a minimum of pickling is required, accompanying this by effective washing of the steel to remove any iron salts or sponge iron. This washing becomes simple if the pickling time is very short. Not only is less alloy formed, but the boundary between the alloy layer and the zinc coating approaches a straight line instead of being very irregular with jagged points of alloy notching the underside of the zinc coating and affording starting points for cracks when the coating is bent.

A second factor is the time of immersion in the galvanizing bath. Temperature is only a minor factor. The time of immersion can be made extremely short, if the iron salts from the pickling are removed by washing and the steel fluxed with 25 per cent. zinc chloride, instead of the common hydrochloric acid flux before it enters the zinc bath. This eliminates the necessity for converting the iron chloride to metallic iron which forms dross and zinc chloride, the latter then acting as a flux—all of this absorbing heat and taking time, to say nothing of producing unnecessary dross. This is the rather simple theory back of the known fact that adherence of zinc coatings can be greatly improved by galvanizing a freshly rolled or drawn steel surface with a minimum of pickling, thorough washing, zinc chloride flux, and a minimum time of immersion in the galvanizing bath.

Coming to the effect of the composition of the zinc it may be stated, first, that, with one or two exceptions, which will be

discussed later, the zinc has little, if any, influence on the thickness or character of the alloy layer. It does, however, have a very great influence on the ductility and toughness of the zinc layer which has been previously mentioned as the second factor determining the adherence of a zinc coating. Cadmium, which is virtually absent in high purity zinc, has a very strong embrittling effect on a cast zinc structure and is present in sufficient quantity in other grades of zinc to greatly increase the tendency of the zinc layer to crack when bent. This is the reason for the extensive use of high purity zinc in galvanizing wire which must have heavy adherent coatings. On the other hand, there are elements which, when added to pure zinc, increase the ductility of the cast structure, either by going into solid solution or through grain refinement. A way to take advantage of such alloying elements may some day be found.

FLUXES AND ADDED ELEMENTS

This brings us to an important problem which in itself has prevented any extensive use of high purity zinc for sheet galvanizing and is likely to be a serious problem in the use of any alloy of zinc. This is the difficulty of maintaining satisfactory entrance and exit fluxes on a sheet galvanizing bath. It is a peculiar circumstance that the zinc ammonium chloride base fluxes, which are exclusively used in galvanizing and for which no substitute seems to have been found in spite of a considerable amount of research on the problem, perform without difficulties only when some lead and cadmium are present in the zinc and so introduce traces of lead and cadmium chlorides into the flux. Incidentally, if the lead and cadmium chlorides are introduced directly into the flux, they are partly reduced to metal which enters the galvanizing bath until an equilibrium is reached between the metallic content of the bath and the chloride content of the flux.

It is this same fluxing problem that has prevented the use of aluminum in sheet galvanizing baths. Aluminum is the principal exception to the earlier statement that the composition of the zinc does not affect the alloy layer. In amounts from approximately 0.2 per cent. upward, aluminum in the zinc bath exerts a profound effect on the alloy layer formation, nearly or completely eliminating the alloy layer present and perhaps changing

the chemical character and physical properties of whatever alloy is formed. The adherence can be greatly improved by such an aluminum addition if other factors are correctly controlled. Various proposals have been made for getting around fluxing difficulties attendant upon the use of high purity zinc in sheet galvanizing and the use of aluminum. It does not seem unreasonable to suppose that an answer may be found to this problem and that an important advance in the production of adherent coatings heavier than the present common commerical grades may thereby result.

If a means of eliminating the fluxing difficulties is ultimately found, this may well open up the field for experiment with alloyed zinc coatings which might have better bending properties or moderately improved resistance to corrosion. It is in this field that the experience of the zinc metallurgist should be of greatest value since much is known about the effect of small alloy additions of other metals to zinc in relationship to corrosion resistance and physical properties. For example, it is known that certain combinations of elements are desirable while other combinations of elements in zinc are incompatible. An excellent example of this is afforded in the die casting field, where a few per cent. of aluminum in a zinc alloy may greatly improve its properties if present in combination with the proper elements and may produce a worthless alloy in combination with other elements. In other words, zinc alloys, like the alloys of other metals, must be intelligently formulated to be useful.

CORROSION PROBLEMS

Having touched briefly upon the matter of chemical properties, the problem of stagnant water corrosion of galvanized material may properly be discussed. Zinc exposed to the weather in the ordinary way forms a film of hydroxide which, absorbing oxygen and CO_2 from the atmosphere, is converted to oxide and carbonate which retards further corrosion. When, however, conditions prevent the access of oxygen and CO_2, the corrosion proceeds rapidly and a voluminous white zinc hydroxide product is formed. This type of corrosion can destroy even a heavy galvanized coating in a comparatively short time. A common condition which can afford an opportunity for this to occur is

when galvanized sheets are piled flat in the open and rain is drawn between the sheets by capillarity, affording the water for hydroxide formation but excluding a proper supply of oxygen and CO_2. Tightly bundled sheets or wire subjected to changes of temperature during storage may condense sufficient moisture to bring about the same condition. Since it is practically impossible to avoid at least the occasional occurrence of such conditions, some means of rendering the zinc coating immune to this type of attack is obviously desirable and a very effective and inexpensive means of doing this has been developed.

The "Cronak" treatment developed by New Jersey Zinc Company consists of removal of oil or grease if necessary, a cleaning in a simple dilute hydrochloric acid dip, and a dip of about 10 seconds in a solution containing a dichromate. This is followed by rinsing and rapid drying at a low temperature. This is ordinarily best accomplished by the use of squeegee rolls followed by an air blast. The rapid low temperature drying is necessary to produce an adherent coating which will stand fabricating operations. A bronze colored film is produced which, in many tests over a period of years, has been shown to prevent completely the formation of white corrosion products and to provide a useful degree of added protection under a variety of conditions of exposure. The process lends itself to continuous application immediately after galvanizing. The solution maintenance is very low and all of the steps simple and inexpensive.

PAINTING GALVANIZED STEEL

There are an important number of cases where steel is used and where conditions are so corrosive that the protection afforded even by heavy galvanizing is not all that is desired. Frequently in such cases a question arises as to whether the galvanizing should be immediately painted or whether painting should be done after the zinc coating is partly weathered away. There is danger of allowing the corrosion of the zinc coating to proceed too far before painting, and it is becoming more common to avoid this danger by painting the galvanized steel at the outset. Also, in cases where the object of painting is for decoration, the painting is, of course, desirable immediately. The satisfactory painting of zinc surfaces has presented a considerable problem,

a solution for which has been approached in many ways. Special types of galvanizing and chemical treatments of the zinc surface have their respective and important merits. But whether such treatments are used, or whether it is necessary to paint ordinary galvanized iron without any chemical treatment, it appears to be rather definitely established that a zinc dust paint is a very satisfactory solution to the problem of an adherent priming coat for zinc surfaces. In many cases, it may also be a suitable finishing coat, though the limitation of color or the desire for the most acid-resistant finish coat often gives the preference to some other paint as a finish coat over the zinc dust primer. A primer formula that has proven particularly satisfactory is 80 per cent. zinc dust and 20 per cent. zinc oxide. By the use of non-gassing zinc dust and a non-acid vehicle, zinc dust paints are produced which package very satisfactorily and give no trouble from gassing or settling. A very large number of paint manufacturers are supplying such zinc dust priming paints at the present time. These paints can be tinted to reds, browns, and greens with satisfactory results.

Although it is somewhat apart from the subject of galvanizing, since we are all interested in the protection of steel and most structural steel depends upon paint for protection, it may not be amiss to point out that a paint of the type just mentioned, modified by the addition of iron oxide, is coming to be recognized as a very desirable priming paint for black iron and steel and is an excellent shop coat paint. Fifteen to thirty per cent. of iron oxide may be satisfactorily substituted for an equivalent percentage of zinc dust.

Nothing has yet appeared to change the fact that metallic zinc is the best and most economical rust protection for steel for the great majority of uses. Hot-dip galvanizing still seems to be the most adaptable method of applying a zinc coating, and while this method has its problems, the possibilities of improving the product and of maintaining a low operating cost appear from the metallurgist's viewpoint to be by no means exhausted. On the contrary, it would be surprising if in this age of technological advance, material progress were not forthcoming in so important a field.

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NEWARK BRANCH A. E. S. — Hotel Douglas, Newark, N. J.

Business and Social News

BRANCH NEWS

Educational Activities

AMERICAN ELECTROPLATERS' SOCIETY

WATERBURY BRANCH

The first meeting of the season was held at the Hotel Elton Friday night, September 9th.

Refreshments seemed to be quite a drawing card as we had a large meeting for this season of the year.

The only business transacted concerned the appointment of an Educational Committee and decision to hold a banquet.

Rather than have an educational session, talking moving pictures were shown by Dr. John Freiheit. During the showing of the pictures and afterwards, refreshments in plentiful quantities and sandwiches were served to the members. The only disappointment of the evening was that Dick Crane did not consider himself to be in fine enough voice to render his usual solo over the loud speaker system. However, the quality of the moving pictures practically made up for this.

Executive Secretary Kennedy was at the meeting and gave us a short report on the educational sessions and business sessions at the Milwaukee Convention.

Unfortunately for the Waterbury Branch, the only report our own members could give was on the extra curriculum activities.

Copies of the Convention Proceedings were distributed with which the boys seemed to be well pleased.

E. T. CANDEE, *Sec.*

PHILADELPHIA BRANCH

The regular monthly meeting of Philadelphia Branch was held at Harrison Lab. on Friday Evening, September 2. Applications were received from A. C. Steel; Harry Brown, Joseph Miraski and G. S. Bergenthal as associate members; reinstated, H. Writer. There will be a meeting at Arcadia Hall 27 W. Orange St., Lancaster, Penna., on Friday evening, September 23 at 8 p.m. A talking picture of Cellite, the story of the Diatom will be shown by Mr. W. J. Bucklee, sales manager of the Phila. District Johns-Manville Co. Oliver Sizelove of the Frederick Gumm Chemical Co. will conduct the Question Box on Cyanide Plating Solutions.

Door prizes will be given, the donors being Messrs. Eckert, Gehling, Underwood and Verelle. Those wishing to attend the Lancaster meeting by bus should write to Mr. George Gehling 5001 Tulip St., Philadelphia. The cost is 75 cents for round trip which is half fare. Those using other means of travel are cordially invited to the meeting. Refreshments will be served.

The annual meeting and banquet of Philadelphia Branch will be held Sat. Nov. 19, at the Warwick Hotel. Paul Mentzer is chairman. Full notice appears in this issue of the REVIEW. Regret was expressed that the convention reports were not received in time for the meeting. The officers have a new membership drive on, which it is hoped will bring results. It is imperative that the membership increase so as to help defray the added expense of issuing the convention reports to all members in good standing.

Remember the Lancaster meeting. The bus leaves Broad St. and Erie Ave. at 6 p.m. sharp Friday, Sept. 23.

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ROBERT E. JACKSON, JR., *Sec.-Treas.*

NEWARK BRANCH

The regular meeting of the Newark Branch A. E. S. was held on Friday evening July 15, 1938 at the Club Room of the Hotel Douglas, Newark, N. J. The meeting was called to order at 8:45 P. M. The following officers were present: John Kotches, President; George Wagner, Secretary; Paul Oldam Librarian; George Reuter, Trustee.

The minutes of the previous meeting were read and approved.

A communication from Mr. R. M. Goodsell, in which he thanked Newark Branch and its delegates for their support at the Convention and in which he asked for the name of the Chairman of our Membership Committee, was read and it was unanimously agreed that Mr. Oliver J. Sizelove be reappointed as Chairman of that Committee, and the Secretary was instructed to answer Mr. Goodsell informing him to that effect.

A communication from Mr. Harold Smallman was read in which he asked for a transfer from Newark Branch to Chicago Branch. This request was granted.

Mr. Edward Bauer was reinstated to Active Membership of Newark Branch.

A letter from Mr. William J. R. Kennedy confirming the Convention Dates for the 1939 Convention at Asbury Park, namely; June 19-20-21-22, was read and placed on file.

Mr. Horace Smith and Mr. Phillip Sievering gave a summary of what was going on at the Milwaukee Convention, stating that all who attended had a wonderful time and that the Convention was a huge success.

Mr. Paul Oldam, our Librarian, asked the members opinion about a program for the winter months, listing the names of the Speakers and their Subjects for our regular meetings, and soliciting ads from Supply Houses to defray some of the expenses. After some discussion it was voted that the Supply Houses should not be asked for contributions this year except for the 1939 Convention.

Twenty members were present. Meeting adjourned 11 P. M.

GEORGE WAGNER, *Sec.*

CLEVELAND BRANCH

The regular monthly meeting of the Cleveland Branch of the A.E.S. was held Sat., Aug. 6, 1938 at Hotel Cleveland.

Meeting called to order at 8:15 by our President Mr. Fred Matts.

The minutes were approved as read.

There were no applications.

Mr. Rudolph Frischknet of the White Sewing Machine of Cleveland, Ohio, was elected an active member.

Mr. R. Lyons chairman of membership committee.

The Branch Picnic was held Sat., Aug. 13, at Sunny Brook Gardens. All the boys turned out hundred strong; there was plenty of food and drinks for

everybody. The gang gathered at 1 o'clock and left at 11 o'clock.

The Cleveland Branch wishes to thank the Supply houses and Plating shops for their donations for the picnic.

Our convention committee gave a very good report on the convention.

There will be a clambake sometime in Sept. or Oct.

Sept. meeting will be held Sat., Sept. 10, 1938.

Meeting adjourned at 10:30 o'clock.

CHAS. OTT, *Sec.*

MILWAUKEE BRANCH

The 290th regular meeting of the Milwaukee Branch that was held at the Republican Hotel on September 1st, was called to order at 8 p.m. by President Dexter Rhodes.

The evening got off to a good start by having a double feature moving picture. Through the courtesy of the Milwaukee Flush Valve Company, we witnessed an interesting demonstration of what is new in the line of bathroom showers and how they are manufactured. Incidentally, Dexter Rhodes happens to have the supervision of the finishing department and this gave the boys an opportunity to see the inside of his plant.

The second feature picture was the surprise of the evening. Mr. Longfield, secretary of the Chicago Branch, ran off a few reels of the picnic that was held at Waukesha Beach this summer at the Convention. We also saw the pictures of the Chicago picnic. We owe a vote of thanks to Mr. Longfield for making the trip from Chicago to provide us with the entertainment.

We then had our regular meeting. Roll call of officers found them all present. Minutes of the previous meeting were read and approved. Communications were read and acted upon and moved that they be placed on file. Motion made and seconded that all bills be paid.

Mr. Robert Steuernagel, who was treasurer of the Convention, gave the financial report of the Convention. It was moved and seconded that we give him a rising vote of thanks, which was carried. Motion made and seconded that the Convention Committee report be accepted.

President Rhodes initiated two new members, namely, Thomas J. Davy and Erwin Wilburth. Mr. Dan Whittig acted as sargeant-at-arms. Motion made and seconded that the secretary be bonded for the sum of $2000.

Mr. Henry Bornitzke, librarian, announced that plans are under way to start a class in chemistry this coming winter. Classes will be held in the Milwaukee Vocational School. Also

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that Mr. Mattacotti of Hanson-Van Winkle will be the speaker at our next meeting.

The following question was found in the Question Box:

What is a good strip for tin?

Ans. Caustic Soda 8 ozs/gal. Reverse current.

Meeting adjourned at 10 p.m. Refreshments were served.

ROBERT B. GOODSELL, *Sec.*

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CHICAGO BRANCH

The regular monthly meeting of Chicago Branch was held on Sept. 10, 1938 at the Atlantic Hotel.

President J. W. Hanlon presided and all other officers were present.

Applications of J. J. Mandercheid, R. W. Conlin, B. P. Sax, E. W. Hoyle, H. B. Wilcox, J. E. Morrison, W. Holzendorf, R. H. Ruenzel, R. R. Granquest, and H. E. Delevitt were balloted on and all elected to membership.

Mr. O. E. Servis, chairman of the picnic, reported that a good time was had by all in the afternoon and when the rain came in the evening the dance hall proved to be a very good shelter to have games and dancing.

Mr. C. Clindinin reported on the membership and asked that only men that would be interested in and do good for the society be given membership.

The meeting was then turned over to the librarian who had Mr. G. Spencer of the Crown Rheostat and Supply Co., give a talk on "Cost Accounting in Plating and Polishing," which was very interesting. Mr. Spencer answered many questions asked by the members and was given

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a rising vote of thanks for his fine talk.

The following questions were found in the question box.

Q. What causes the pH of a nickel solution made up of single and double nickel salt, sodium chloride and boric acid to rise?

A. Too large an anode area or too low in boric acid.

Q. How do electrolytic anodes perform? How do they corrode? Are they satisfactory?

A. This question was referred to Mr. W. Pinner's and Mr. E. Borchardt's paper on "Proper Anode Corrosion" in the Convention Proceedings.

Q. How high can the pH of a nickel solution be raised with nickel carbonate?

A. Old nickel carbonate will raise it to pH 6.0, freshly precipitated nickel carbonate will raise it to pH 6.4, and freshly precipitated nickel hydroxide will raise it to pH 6.9, all electrometric readings.

Q. Is it necessary to deposit copper under bright nickel to lengthen the weather resistance?

A. No.

Q. What is the best procedure to plate nickel on buffed nickel?

A. Cathodic clean in copper cleaner, or clean and cathodic etch in mild acid solution for three minutes, or brush with greaseless compound, clean and nickel plate.

Q. How can a bright finish be obtained on cadmium plate in a barrel with six volts?

A. Cadmium plate and dip in nitric acid bright dip or roll in platin solution for about five minutes after plating without current.

M. H. LONGFIELD, *Sec.-Treas.*

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BRIDGEPORT BRANCH

The first regular monthly meeting of the season for the Bridgeport Branch was held on Friday, Sept. 9, in the Chamber of Commerce Rooms of the Stratfield Hotel. Joe Sterling, president, called the meeting to order. There were twenty-five members present.

The roll call of officers was read and all were present. The minutes of the last meeting were read and accepted. The report of the Outing Committee was made and accepted.

Communications were read and placed on file.

The application of Robert Reid was read and accepted.

New Business: Mr. Walter Meyer gave an interesting talk concerning the formation of a chemistry class, and urged the members to give their support to this enterprise. Further information concerning the class will be given at the next regular meeting. A more definite date will also be announced in the near future for an open meeting.

All bills against the Branch were ordered to be paid. The treasurer's report was read and accepted.

The meeting adjourned at 11 p.m., the educational session having been dispensed with, owing to the late hour.

OUTING

There were seventy-five members and guests present at the Annual Outing held by the Bridgeport Branch on Saturday, Sept. 10, at Trumbull, Conn. The Branch heartily thanks the cooperation of members of the Hartford, New Haven, and Waterbury Branches and extends its appreciation for the presence of Bill Kennedy and Tom Haddow.

A high-light of the affair was the ballgame between the Platers and the Salesmen. As usual the Salesmen were the victors. Ben Kusterer turned out to be a little better umpire than did Hank Kellmer of the Lea Mfg. Co. turn out to be a second baseman, for Hank turned a great deal of his interest to a Plater running to second base when all of the time he thought it was Geo. Karl. Prizes were donated by John English of the Wyandotte Mfg. Co. and Roland Doucette of the Fred Gumm Chemical Co. and George Karl of the Maas and Waldstein Co.

In poker the Platers had a hand at victory; Gussie Oberender won for the women and Tom Haddow was the lucky man. A great laugh came from the fact that after attending Outings for eighteen years, Mrs. Karl finally won a pipe for George. This lovely pipe was a gift of the Fred Gumm Chemical Co. Bob Leather took plenty of kidding for the red shirt, and Ray O'Connor for his new lip arrangement.

Considerable thanks are extended to all of those who helped in any way to make the affair a success; Mr. Eugene Phillips, of the Puritan Mfg. Co., and Mr. Joseph Sterling of the General Electric Co., and the committee that assisted these men. May we see all of our local members and out-of-towners at the next Outing. Door Prizes were awarded to Mr. Gogozzo and Mrs. Backus of Hartford, Mrs. Phillips and Mrs. Karl of Bridgeport, and Mr. Langdon of New York.

WILLIAM FLAHERTY, *Sec.*

HARRISON & COMPANY
HAVERHILL, MASS.

Have continually improved the quality of their various compounds. New numbers used to buff stainless high carbon steels, besides other steels, including very soft steel and iron, are included in their long line of compounds.

Their new 4A Cement and Thinner, used on leather wheels and belts, canvas, felt, and cloth belts, wheels, and rolls, are now included in their line.

They will be pleased to submit Samples on request.

HARRISON & COMPANY
HAVERHILL, MASS.

"A PRODUCT FOR EVERY FINISH"

DETROIT BRANCH MEMBER DIES IN AUTO ACCIDENT

Mr. R. G. Johns, an associate member of Detroit Branch, employed by F. B. Stevens, Co., Inc., as a salesman, was killed in an automobile accident August 27th in Detroit.

The members of Detroit Branch wish to express their sorrow in the loss of one of our good members. Our deepest sympathy is extended to the relatives and friends of the deceased.

BRIGHT ZINC PLATING IN STILL TANKS SEMI- AND FULL AUTOMATIC

The Mazic process developed by the Hanson-Van Winkle-Munning Co. Matawan, N. J., manufacturers of electroplating equipment and supplies, yields zinc deposits which are bright and lustrous and which are very similar in appearance to cadmium deposits. The following conditions must be observed, however, in order to obtain the best results from Mazic solution.

Solution

Zinc Cyanide	8 oz./gal.
Sodium Cyanide	5 oz./gal.
Sodium Hydroxide	11 oz./gal.
Mazic Brightener	1-1/2 gal. to 100 gal.

which will analyze when in solution, approximately:

Zinc	4.5 oz./gal.
Total Sodium Cyanide	12 oz./gal.
Sodium Hydroxide	11 oz./gal.

The optimum proportion of this material is 1-1/2 gallons to 100 gallons of plating solution.

Operating Conditions

The permissible cathode current density of the solution is much higher than in ordinary zinc solutions. It is truly a *high speed* plating bath. Good results are obtained with a cathode current density of from 40-60 amperes per square foot with an optimum of 45 amperes per square foot. A voltage at the tank of between 3 and 4 volts is essential to insure proper operation of the solution. With a current source of 6 volts pressure a 2 volt drop rheostat is recommended. The solution should not be operated at temperatures below 75°F. nor above 110°F. A good working range is between 75-100°F.

Unlined steel tanks should be used for this solution.

Anodes

Only Mazic anodes can be used in this solution. These anodes are made from special alloy cast under controlled conditions. There is no sludge. The solution remains clean and the deposits are free from roughness or sludge inclusions. There is no chemical attack of these anodes when the solution is not being used; also these anodes do not polarize. It is unnecessary therefore, to remove them from the solution at any time. The anode area should be approximately 1-1/2 times larger than the cathode surface. Ball anodes may be used advantageously. The ball anode containers should be spaced about three to each foot of anode rod.

Rinsing and Bright Dipping

After the work has been plated it is necessary to rinse thoroughly before the bright dip, to remove the highly caustic film of plating solution. The rinse water should be clean. If nickel, cadmium or copper from previous rinsing operations is carried into the bright dip, staining will occur.

The work is dipped for a few seconds in the bright dip which consists of a 1/2% nitric acid solution. In regions where the water is highly chlorinated, the bright dip should be boiled for a few hours and allowed to cool before using.

The work is again rinsed in cold water and for best results, dipped in a solution of 2 oz./gal. of sodium cyanide, then rinsed in cold water, then in hot water and dried.

Lacquering Mazic Plated Work

Ordinary lacquers are not satisfactory over zinc deposits. A special lacquer has been developed for use over bright zinc and its use is strongly recommended for work that is subjected to outdoor exposure or to constant handling.

Here and There

Waterbury Branch held its first meeting of the Fall on Friday Evening Sept. 9. There was a fine attendance. Vice-president Coleman did the honors in the absence of President Lougee. Through the persuasiveness of Librarian Earl Couch, Dick Crane brought his friend, Dr. Freiheit, a leading Waterbury doctor along. The Doctor entertained us with three reels of moving pictures which were thoroughly enjoyed. The "Brass City" members are fortunate in having the medical profession so cooperative with the the platers.

Waterbury is a live wire Branch. We expect to see a big increase in membership there this year.

Past President A. B. Wilson is coming to New Haven on Thursday, October 13 to speak to the Branch. He is bringing with him some General Motors moving pictures that should create a lot of interest amongst the plating fraternity.

Mr. Wilson's work as president last year was so outstanding that every member of New Haven and other nearby branches should be on hand to give him a real New England welcome. Bridgeport, Waterbury, Hartford and Springfield members and all others interested are asked to attend.

Comments from our members who have received their copies of the Proceedings.

Joe Downes: "I think it's a swell job."

Ted Eichstaedt: "Excellent. Business sessions should be included in the future."

Dr. Walter Meyer: "I think they're fine. This is one of the best things the Society has done."

George B. Hogaboom: "A nice size and a nice job."

Byron Hogaboom: "Looking over a copy casually, I think it's a fine job."

President Phillips: "I am very well pleased with my copy."

A. B. Wilson: "It is OK."

Tennant Elwin: "The photos and reading matter are good. I like my copy."

Ellsworth Candee: "Everyone in our Branch (Waterbury) seems to be satisfied."

Wm. Flaherty: "The Bridgeport boys like their copies."

Name Withheld: "I wonder how many of the members will read their copies."

Derrick Hartshorn: "I don't know how they did it for the price. It's good."

Dr. A. K. Graham: "From casual observation I should say it's a very fine job."

George Dubpernell: "Clear and distinct. It's a good volume to have."

Tom Chamberlain: "It's a real job."

Most of the branches will have received their copies by this time so we would like more comments pro and con to guide us in future years.

If you have not received your copy write to the Secretary of your Branch. There is a copy for every member *in good standing.*

DON'T GET IMPATIENT

The members of the Constitution Revision Committee are doing all they can to get the new constitution into shape. Just as soon as the copies are printed, they will be mailed to each Branch Secretary. Past President T. F. Slattery is Chairman of the Committee. The other members are Messrs. Fraine, Hogaboom, F. J. Hanlon, Servis and Kennedy. President Phillips is a member ex officio.

The Bridgeport outing on Saturday was a huge success. The weather was perfect and those in attendance enjoyed every minute of their stay. Baseball, horseshoe pitching and shuffle board took the attention of the men, while the ladies walked and talked and played cards for amusement. A fine chicken dinner in the early evening brought all together, after which there were more games and other amusements.

There was a good attendance, and a nice spirit of friendliness. Ray O'Connor and Bob Leather told a group of interested listeners about their trip to the Canadian Woods from which they have just returned. Bob and Ray evidently don't relish wild duck the way their Indian Guides cook it. Ask them about it sometime.

Joe Sterling was the busiest man at the party, but he sure knows how to get things done. Tom Haddow of Maas & Waldstien, Newark was present also, Mr. and Mrs. John Oberander, Mrs. Leather, Mrs. O'Connor, Mrs. O'Neill, Mr. & Mrs. Kusterer, Walter Meyer, Palmer Langdon, Joe Sullivan and Jack Barry (who think they can pitch horseshoes but can't) Fred Norgren, Douglas MacDermid, Gene Phillips, Doc Kellner, R. Ducette, Joe Downes, Ellsworth Candee and a host of other men and women whose names we wish we knew, all had a swell time and departed in good season, well satisfied with the day's outing.

We are sorry to learn that our good friend Bill Gray of Waterbury Branch has recently been indisposed. We hope he will continue to improve. Bill has been a tower of strength in his own Branch and a valuable member in the A. E. S.

His many friends will be glad to learn that Harry MacFadyn of Hartford Branch is recovering nicely from his severe illness.

Harry has been one of the hardest working members of the Branch and has contributed largely to the welfare of the entire organization.

It's always a pleasure in visiting Waterbury to call on the Elwins. We had a nice visit and had lunch on Saturday noon with Tennant, Mrs. Elwin and their daughters. A happy family if ever there was one. Mr. Elwin and the Executive Secretary held office together for several years in the Hartford-Connecticut Valley Branch.

Mr. Longfield, Secretary of Chicago Branch, has sent us the names of fifteen men who have joined Chicago Branch since August 16. This is a good record; someone must have been busy in the "Windy City" during the summer season.

Remember the membership goal this year is 800 new members.

SAMUEL J. SIZELOVE

The members of the American Electroplaters Society extend their sympathy to Oliver Sizelove of the Fred Gumm Chemical Co., Kearney, N. J., in the death of his father Samuel J. Sizelove, at the age of 81 years. Mr. Sizelove was a resident of Pittsfield, Ill.

WALTER R. MEYER

New Editor of *METAL INDUSTRY*

Dr. Walter R. Meyer, one of our most prominent members, has accepted the position as Editor of the *Metal Industry*. This news will be very pleasing to his numerous friends in the A. E. S., and other organizations with whom he has worked unsparingly for many years.

Walter, as he is familiarly known, has contributed largely to the successful

growth of our organization, and has presented many excellent papers at the conventions and various branches of the Society.

The A. E. S. membership expresses its pleasure at Dr. Meyers appointment. Our best wishes go with him as he assumes his new duties October 1st.

We have personally assured the new Editor of the *Metal Industry* that we will cooperate with him and with the valuable publication with which he is connected, in every way possible. Bridgeport Branch of which he is a member is highly honored in his selection to this position of greater usefulness and service. We believe we can truly say that Walter will still keep in touch with the various activities of the Society even though his new field will keep him busy along lines other than the plating industry.

Following his graduation from Yale University in 1928 where he obtained the degree of B.S. in Chemistry with the ranking of magna cum laude, Dr. Meyer accepted the position of chief chemist at Sargent & Co., New Haven, Connecticut, where he did development work in electro-chemistry, lacquer formulation, casting of nickel alloys and hydraulic fluids.

Since 1931 he has been associated with the General Electric Company, Bridgeport, Connecticut, as chief metallurgist and electrochemist. Here Dr. Meyer's work was concerned with electrochemistry, hot galvanizing, detergents, analytical methods, spectroscopy, acid treatment of metals, extrusion of lead, metallography, rubber fillers and lubrication.

In 1936 he was awarded the Founders Gold Medal of the A. E. S. and for outstanding work in the electrodeposition of metals he was awarded a Ph.D. in metallurgy from Yale University in 1937. The same year Dr. Meyer presented a paper at the international conference on Electrodeposition at London, England. He has studied laboratory and factory methods in England, Holland, Germany and Sweden.

In this country he is well known for his active participation in the American Electroplaters' Society, where he serves on the Research Committee. Dr. Meyer is also a member of The American Society for Metals, The Electrochemical Society, The Faraday Society, Deutsche Bunsen Gesellschaft, Electrodepositor's Technical Society (England) and Sigma Xi.

WILL OUR READERS PLEASE TAKE NOTICE

It is imperative to secure new papers for the REVIEW this year as the new policy of distributing convention proceedings precludes the possibility of printing those papers a second time so that co-operation is requested from all to secure new material for publication immediately.

These need not be technical or research papers nor is it necessary to present revolutionary ideas. The platers are interested in learning how things are done by their fellow members and in fact this policy was particularly stressed as a desirable feature at the convention as well as in letters both from at home and abroad, to the writer.

As chairman of the educational activities of the Supreme Society it is your near editor's hope that Philadelphia will make a good showing on these papers for REVIEW publication while any assistance required in presenting ideas will be readily forthcoming. Do not hesitate to write, as there may be some knack or kink in your processes very ordinary to you, but highly interesting to others, so cast about until you think of the thing you are doing as you have never seen it done elsewhere and tell about it.

This is an abstract from the Philadelphia Reminder of Sept. 1938, *by Fred Fulforth, Editor.*

MILWAUKEE BRANCH PRESENTS US WITH A $500 CHECK

On September 8 we received a letter from Robert B. Goodsell, secretary-treasurer of Milwaukee Branch, enclosing a check for the above amount as a gift from the Branch which entertained us so well during the Convention in June.

In a letter of thanks to Mr. Goodsell, we asked him to assure the membership that the money will be spent as wisely as possible and to further assure them that this expression of good will as manifested by the recent gift in conjunction with the splendid work of the Convention Committee which is still fresh in our minds, is deeply appreciated by our entire membership. We could write many pages regarding the men who made such a pronounced success of the Milwaukee meetings but we will leave that to Ray Goodsell, our First Supreme Vice President, or Robert Steuernagle, who was responsible for the finances. These two with Dan Wittig, and Dexter Rhodes, the Branch President, and the other Committee Chairmen, could give us an interesting story of the joys and sorrows of running a Convention. Suffice it to say to every member of Milwaukee Branch—"Thanks A Million!"

Mr. C. H. McAleer, President announces several changes in the Officers and Directors of the McAleer Manufacturing Company.

Mr. Louis F. Davis, formerly of Philco Radio and Television Corporation and Kroger Grocery & Baking Co., who was elected Vice-President and Treasurer, will act as General Manager.

Mr. A. H. Regener continues as Secretary of the Company as well as Credit Manager. Mr. A. G. Neubauer is in charge of sales to the Distributors, Mr. C. J. Kennedy is in charge of sales to Manufacturers. Mr. F. A. Weihe, Jr., is Factory Manager and Mr. Ernest Hummitch, Purchasing Agent and Advertising Manager.

The new Board of Directors is composed of the officers of the Company and Mr. E. S. Finch of New York City and Mr. R. William Rogers of the firm Bulkley, Ledyard, Dickinson and Wright, attorneys for the company.

Coincident with these changes Mr. C. H. McAleer is able to report a very satisfactory profit for the second quarter compared to a first quarter loss of $30,726.27. Prospects for the third and last quarter are especially encouraging as the company derives considerable volume from the automotive industry.

RESEARCH COMMITTEE MEETING HELD IN NEW YORK

A meeting of the Research Committee of the A.E.S., was held at the New Yorker on Friday, Sept., 16 at 1.00 P. M. The Chairman, George B. Hogaboom presided. Previous to the meeting an inspection of plated specimens was held on the roof of the Bell Telephone Laboratories under the direction of Dr. Blum.

Great interest was shown in this inspection especially in the "Bright Nickel" panels that were placed on the roof for outdoors exposure. Definite conclusion could not be drawn regarding the "Bright Nickel" plated parts and their reaction to the atmosphere as they have only been placed on the racks for six weeks.

The following attended the Research Meeting and Inspection at the Bell Telephone Laboratory:

E. A. Anderson	New Jersey Zinc Co.
F. Fulforth	Proctor Schwartz Co.
Carl Heussner	Chrysler Corp.
B. H. McGar	Chase Brass & Copper Co.
P. R. Pine	Harshaw Chemical Co.
G. Soderberg	Udylite Co.
W. A. Wesley	International Nickel Co.
B. C. Case	Bridgeport Brass Co.
Walter Meyer	Editor, Metal Industry
Nelson Sievering	Philip Sievering Co.
C. M. Hoff	duPont Co.
Erwin Sohn	Standard Sanitary Co.
Dr. William Blum	Bureau of Standards
P. W. C. Strausser	Associate at the Bureau
Paul Savage	McGean Chemical Co.
Byron Hogaboom	Consultant, Newark, N. J.
W. M. Phillips	General Motors Corp.
A. B. Wilson	Chevrolet Co.
Dr. Wick	Bethlehem Steel Co.
Professor Baker	University of Michigan
Horace Smith	Tiffany Co.
Oliver Sizelove	Frederick Gumm Co.
George B. Hogaboom	Hanson-Van Winkle-Munning Co.
Paul Savage	McGean Chemical Co.
Carl Steidel	McGean Chemical Co.
W. Tracy	American Brass Co.
Philip Sievering	Philip Sievering Co.
W. J. R. Kennedy	Executive Sec., A.E.S.
K. V. Schwartz	United Chrome Co.

There was much discussion at the meeting regarding the work to be carried on in the future at the Bureau. A fuller account of this meeting will be given in the October issue of the REVIEW.

It was nearly 6.00 P. M. when the meeting adjourned after which some of the members present went to Newark Branch meeting at 8. There was a splendid attendance at this meeting, the boys being anxious to receive their Copies of the Proceedings. A general feeling of satisfaction was manifested as the books were given the "once over" by the members.

Dr. Blum, Paul Strausser, Fred Fulforth, Dr. Walter Meyer, George B. Hogaboom and others spoke briefly on various subjects to the members.

John B. Kotches presided, Paul Oldam the Librarian asked Mr. Hogaboom to act as honorary Chairman, and George Wagner distributed the Proceedings.

Past President Horace Smith invited the boys to visit Asbury Park after the inspection of the exposed panels at Sandy Hook the following day. Nineteen members took the trip to the "Hook" in cars supplied by the members and made a careful inspection of the Specimens. The weather man favored us on this occasion as it started to pour shortly after the last of the racks were checked. Twenty-six persons enjoyed the trip to Asbury Park including "nine lady members of Newark Branch" who accompanied their husbands.

These ladies are going to be counted on heavily to make the International Convention an outstanding success. Those who looked over the site of next year's Annual Meetings were unanimous in their belief that Newark Branch chose an ideal place in which to hold the Society's 27th annual event.

The day's activities were brought to a close with a luncheon which was fully enjoyed by the following:

Mrs. Paul Oldam, Mrs. G. Reuter, Mrs. John B. Kotches, "Rose", Mrs. George Wagner, Mrs. O. J. Sizelove, Mrs. Horace Smith, Mrs. Nelson F. Sievering, Mrs. Roy Stout, Paul A. Oldam, George Reuter, John B. Kotches, George Wagner, O. J. Sizelove, Nelson F. Sievering, Roy Stout, Phillip Sievering, Horace H. Smith, Frederick Fulforth, W. M. Philips, W. Blum, W. R. Meyer, P. Strausser, George B. Hogaboom, B. C. Case, W. J. R. Kennedy.

General Chairman Horace H. Smith was given a vote of thanks for his kind invitation to visit the scene of next year's Convention activities.

KOCOUR ANALYTICAL SET

For the Control of
Brass Cyanide Electroplating Solutions
Determines Copper, Zinc, Free Cyanide, and Sodium Carbonate

For the Control of
Copper Cyanide Electroplating Solutions
Determines Metal Content, Free Cyanide, and Sodium Carbonate

This Kocour Analytical control set, enables anyone to rapidly determine the condition of a cyanide brass solution. When used with a comparator or other pH instrument all of the necessary factors for proper control of a brass solution are known. It is well understood that maximum efficiency is obtained only when solutions are maintained at proper concentration of the various ingredients. Such factors as the time necessary to deposit a given thickness, the current density permissible, the non-porosity of the plate, and the appearance of the deposit are all dependent upon a balanced solution.

The set is extremely easy to operate, the makers having in mind that the average user knows little or no chemistry. Directions are easily followed and the results as easily obtained. Readings obtained from the set are the results sought, there are no involved calculations required. All readings are in ounces per gallon of solution of the various ingredients. Directions also include means of altering solutions should they be out of balance.

The set, consists of a well made wall cabinet fitted with hardware to hold the

necessary glassware during use and storage. The glassware is of finest make, some of it made especially for us. The solutions are in easily handled bottles, well labeled. The solutions can be used regardless of age, they need not be fresh to give accurate results. This insures correct results and economical operation at all times. Directions, as mentioned above, are very complete.

			Price	Code
KOCOUR Analytical Set 2F213 for copper, zinc, free cyanide, and sodium carbonate			$28.00	*dufe*
KOCOUR Analytical Sets for determining pH of cyanide brass solutions	**Model**	**Range**		
	KLP	9.6-11.2	12.50	*kalep*
	KLS	11.0-12.6	12.50	*kalis*
KOCOUR Analytical Set 2F13 for metallic copper, free cyanide, and sodium carbonate			**Price** $23.00	**Code** *dobi*
KOCOUR Analytical Sets for determining pH of cyanide copper solutions	**Model**	**Range**		
	KLP	9.6-11.2	12.50	*kalep*
	KLS	11.0-12.6	12.50	*kalis*

Prices are net at Chicago

ADOLPH BREGMAN

Adolph Bregman, Metallurgical Engineer, since 1919 Managing Editor of Metal Industry, has severed his connection with that journal as of October 1st and established an office at 123 William Street, New York as a consultant in the metal products manufacturing and metal finishing industries. He will specialize on industrial problems, development of products and industrial markets, a field in which he has been engaged for a number of years. He has been Executive Secretary of the Master's Electro-Plating Association of New York since 1934 and will retain that position.

Mr. Bregman is the author of a number of technical and industrial articles. He is a member of the Institute of Metals Division, A.I.M.E. and the American Society for Testing Metals.

THIRD ANNUAL OUTING OF DETROIT BRANCH

The Third Annual Summer outing of the Detroit Branch American Electroplaters' Society was held at Sandy Mac's Golf Course Saturday, Aug. 6, 1938, and everyone who attended had a good time. The attendance was not quite as good as last year's. The weather had quite a lot to do with it. While it did not rain it was threatening and caused quite some doubt as to whether or not there would be a picnic on this account. All those who were there expressed themselves very emphatically that it was the best they had ever attended. The food and especially the sweet corn and German homemade potato salad were good and there was plenty of the "Amber Fluid" for all. The contests were all run off in order without any accidents and the prizes furnished by the firms herewith were all well worthwhile:

Automotive Rubber, Inc.,	6044 Woodward Avenue.
H. L. Shippey,	14115 Woodmont Road.
Belke Mfg. Company,	1627 W. Fort Street.
Matchless Metal Polish Co., c/o B. R. Boyd	5-207 General Motors Bldg.
Buckingham Products,	8900 Hubbell.
Bruce Products Corporation,	5712-12th Street.
Collord, Inc.,	5049 Lyndon.
Peter Cooper Glue Corp., c/o V. Val Rance	1925-19th. Street.
Detroit Rex Products Co.,	13011 Hillview.
Eaton Clark Co.,	1490 Franklin Street.
J. B. Ford Co.,	Biddle St., Wyandotte, Mich.
General Abrasive Co., c/o W. F. Ford,	Niagara Falls, N. Y.
B. F. Goodrich Co., c/o W. R. Wash,	623 New Center Bldg.
Hanson Van Winkle Munning Co.,	2842 W. Grand Blvd.
Harshaw Chemical Co.,	1627 W. Fort St.
Hughes Glue Co.,	3500 St. Aubin.
Industrial Chemical Prod.,	3777 Bellevue.
R. C. Mahon Co.,	8650 Mt. Elliott.
McAleer Mfg. Co.,	2431 Scotten Ave.
Michigan Buff Co.,	4058 Beaufait.
J. C. Miller Co.,	Grand Rapids, Mich.
Minnesota Mining & Manufacturing Co.,	411 Piquette.
H. A. Montgomery Co.,	17191 Swift.
Northwest Chemical Co.,	6531 Russell.
Norton Company,	5805 Lincoln.
Oakite Products Inc.,	10-255 General Motors Bldg.
Parker Wolverine Co.,	5203 Martin.
F. B. Stevens, Inc.,	3rd. and Larned.
United Chromium, Inc.,	2751 E. Jefferson.
The Udylite Co.,	1651 E. Grand Blvd.
E. J. Woodison Co.,	7415 St. Aubin.
A. T. Wagner Co.,	2700 Wight.
Sandy Mac Golf Course,	8415 Tireman.
Park Chemical Co.,	8074 Military Ave.

The prize winners were:

Sack Race:	Joe Rine,	J. C. Robinson Co.,
Three-Legged Race:	Ernest Livernois, Geo. Hatala,	1463 Henry Place. Det. Hdw. Mfg. Co.
Horse Shoe Pitching	Geo. W. Walter,	Det. Rex Prod. Co.

Contest:	G. A. Meyers,	Bruce Prod. Co.
	R. B. Buckingham,	Chevrolet Motor Co.
	Isidore C. Roy,	Chrysler Motor Corp., of Windsor, Ontario.
Wheel Barrow Race:	Carl Durbin,	Chrysler, Canada Plant.
	Isidore C. Roy,	Chrysler, Canada Plant.
Fifty Yd. Dash:	C. R. Amluxen,	Standard Accident Ins.
Golf Accuracy:	C. E. Heussner,	Chrysler Corp.
Golf Game:	M. Laderoat,	J. C. Robinson Co.
	Sam Gilleti,	Saginaw Plating Co.
	E. J. Bieghtol, Sr.,	Grand River Plating.
	G. A. Meyers,	Bruce Products.
	Cliff Campbell,	Chevrolet Co., Pontiac.
	L. H. Paul,	J. C. Robinson Co.
Auto Race:	John Corsey,	Master Chrome Plating.
	C. Shrader,	J. C. Robinson Co.
	Chester Marshall,	Ainsworth Mfg. Co.
	Geo. Lehman,	J. C. Robinson Co.
Winning Ball Team:	C. R. Amluxen,	Standard Accident Ins.
	C. R. Charleston,	Industrial Cham. Co.
	Walter Primer,	Gen. Spring & Bumper Co.
	J. Clayton,	Hanson Munning Co.
	T. Marshall,	Ainsworth Mfg.
	Joe Rini,	J. C. Robinson Co.
	J. Kuschner,	Cadillac Motor Car.
	T. Partenski,	Douglas & Lomeson.
	C. Nixon,	Ternstedt Mfg. Co.
Umpires:	C. E. Heussner,	Chrysler Corp.
	W. W. McCord,	McCord Mfg. Co.
Door Prizes Won by:	Eric Sampson,	Chevrolet Corp., Flint.
	Ernest Livernois,	Detroit Hdwe. Co.
	Andrew Churilla,	Packard Motor Car Co.
	Jas. Farmer,	Lufkin Rule Co., Saginaw.
	L. J. Flanigan,	Chevrolet Forge Co.
	J. Bosby,	Mich. Die Casting Co.
	Wm. Phillip, Jr.,	Udylite Co.

Socially it was a huge success. Mr. W. J. R. Kennedy, our Executive Secretary of the Supreme Society from Springfield, Massachusetts, was in attendance and enjoyed himself very much. Mr. Ray Goodsell of the Racine Plating Company, Racine, Wis., our Supreme First Vice-President was also present as was Mr. Wm. Phillip, the Supreme President, he being a member of Detroit Branch; and Mr. A. B. Wilson of the Chevrolet Forge Plant, Detroit, who is Supreme Past President. These representatives of the Supreme Society constitute the majority of the Executive Board. They had a meeting on one of the "Knobs" of the golf course in the afternoon and no doubt did quite a lot of planning for the activities of the Society for the fiscal year. It was indeed a pleasure for Detroit Branch to be host to these distinguished gentlemen of the Executive Board and Detroit Branch wishes to go on record as pledging its loyalty to the entire Executive Board and wishes them a successful year.

Among those present at the picnic who seemed to enjoy themselves very much were James Higgins of Packard Motor Car Company, our President;

Carl Heussner of Chrysler Motor Car Company our Vice-President and yours "truly".

The baseball game was a success. It consisted of two teams made up by choosing sides and all those playing had a good time as well as all who watched it. Carl Heussner and Wm. W. McCord umpired.

Detroit Branch will start its regular meetings again on Sept. 9 at Hotel Statler and the Program Committee, Mr. Chas. Eldridge of the United Chromium Corp. has all the meetings with a few exceptions provided for and the following for September, October, November and December meetings:

Sept. 9—Mr. H. R. Norgren, Special Representative, Detroit Rex Products Company, Detroit, Michigan. Subject: "Modern Developments in Vapor Degreasing" illustrated with Motion Picture Film.

Oct. 7—Mr. R. J. Amber, Sales Representative Johns-Manville, Detroit, Michigan. Subject: "Celite Filter Aids" illustrated by a talking motion picture describing the formation, mining and properties of the product.

Nov. 4—Dr. A. Kenneth Graham, Consulting Engineer, Jenkintown, Pennsylvania. Subject: "Rochelle Salt Copper Plating Baths".

Dec. 2—Dr. Colin G. Fink, Professor of Electrochemistry, Columbia University, New York City. Subject to be announced later.

Detroit Branch expects to have its second annual Dinner Dance and Educational Session in December again but have not definitely decided upon the date.

T. C. EICHSTAEDT, *Sec.-Treas.*

An instrumentation contest with a first prize of $200.00 in cash is announced by the Industrial Instrument Section of Scientific Apparatus Makers of America.

Twelve prizes in all, totaling $500.00 will be awarded by the Apparatus Makers. The contest is open to any engineer or operating man, not employed by an instrument manufacturer. Each contestant is to write about an *unusual* application of a *standard* instrument or control device, telling briefly what conditions or need impelled the application. By instrument or control device is meant any device used for measurement or control in a plant or laboratory, or any accessory used with a device for measurement and control.

The contest will be judged by the following Jury of Award—Chairman Lyman J. Briggs (Director, National Bureau of Standards). Members: M. F. Behar (Editor *Instruments*), W. E. Forsythe (Physicist, Nela Park Research Dept., General Electric Co.), John J. Grebe (Director of Physical Research Laboratory, Dow Chemical Co.), R. J. S. Pigott (Head of Engineering Dept., Gulf Research & Development Co.) and Ex-officio Phil T. Sprague (Chairman, Industrial Instrument Section S.A.M.A. and President of the Hays Corp.).

The contest closes November 15, 1938 and the judging will be held during the week of December 5th.

Copies of the contest rules and official entry form can be obtained from—

Scientific Apparatus Makers of America
20 North Wacker Drive, R. 3014,
Chicago, Illinois.

CORRECTION

The article printed in the August REVIEW entitled Bright Nickel Plating by R. J. Green stated on page 604 that the solution contained Single Nickel Salts, 8 oz/gal. which is an error. It should have read Nickel Metal 8 oz/gal. This would mean about 36 oz/gal. of Single Nickel Salts.

PHILADELPHIA BRANCH
AMERICAN ELECTROPLATERS' SOCIETY
ANNUAL EDUCATIONAL SESSION
HOTEL WARWICK
November 19, 1938

Personal and social contacts of electroplaters with representatives of equipment manufacturers, users of electroplating, and supply houses are valuable to each and should be expanded in a manner equable to all.

The Philadelphia Branch, American Electroplaters' Society proposes to entertain these groups at identical cost to each by the elimination of all paid program advertising or solicitation of any kind for funds, other than purchase of tickets, entitling your representatives to admission to all features of the Annual Educational Session and Banquet; while to provide ideal surroundings for promotion of the better personal relationship desired, both the meeting and banquet will be held in the grand ballroom, connecting foyers and anterooms of the

HOTEL WARWICK
17th and Locust Streets
Central City — Phila., Pa.
Saturday, November 19, 1938

Educational Session 2 p.m. Banquet 7 p.m.

TICKETS — $2.75

Out-of-town arrivals may be adequately accommodated in the hotel at a cost of $4.50 single, $7.00 double, or within a few blocks at lower rates, while full guest accommodation and privileges at the adjacent Penn Athletic Club for men only at $3.00 are available.

Unlimited street parking from noon on Saturday or in nearby reasonably-priced space.

Visiting ladies will be entertained during the afternoon in the Colonial Room on the mezzanine floor opposite the ballroom foyer.

Direct entrance to elevators for all activities on Locust Street side.

The prize drawing feature of our banquet will be even bigger and better this year, many valuable contributions having already arrived without solicitation, which displays our friends' appreciation of our efforts to provide a good time for all and if possible a prize for everyone in attendance.

During the banquet our old M. C., Andy Arcari will be on hand with his accordion and inimitable style to amuse and lead the mass singing.

After a floor show of first billing quality, dancing to the music of The Pennsylvania Clivedens will follow.

The educational program includes such speakers as:

Mr. Floyd Oplinger of the duPont Company — *Copper Plating from Cyanide Solutions.*

Mr. B. G. Daw, Vice-president of Lasalco, Inc.— *Practical Demonstration of What Happens in a Plating Barrel.*

Mr. Geo. B. Hogaboom of Hanson-Van Winkle-Munning Company — *Color Finishing,* with samples exhibited on display board.

FREDERICK FULFORTH

ELECTIONS

Thomas J. Davy, 4740 N. Drake Avenue, Chicago, Ill.
Associate, Milwaukee Branch

Edwin Wilburth, 3522 N. 23rd St., Milwaukee, Wis.
Active, Milwaukee Branch

J. J. Manderscheid, 844 W. 49th Place, Chicago, Ill.
Associate, Chicago Branch

R. W. Conlin, 17 W. Elizabeth St., Chicago, Ill.
Associate, Chicago Branch

B. P. Sax, 228 N. Clinton St., Chicago, Ill. Associate, Chicago Branch
E. W. Hoyle, 224 N. Le Clair Ave., Chicago, Ill. Associate, Chicago Branch
H. B. Wilcox, 1943 Walnut St., Chicago, Ill. Associate, Chicago Branch

J. E. Morrison, 134 S. Clinton St., Chicago, Ill.
Associate, Chicago Branch

W. Holzendorf, 2320 Fullerton Ave., Chicago, Ill.
Associate, Chicago Branch

R. H. Ruenzrl, 1645 Carroll Ave., Chicago, Ill.
Associate, Chicago Branch

R. R. Granquist, 4110 N. Keystone Ave., Chicago, Ill.
Associate, Chicago Branch

H. E. Delevitt, 4329 W. Kinzie St., Chicago, Ill.
Associate, Chicago Branch

Robert William Reid, S. Benson Rd., Fairfield, Conn.
Associate, Bridgeport Branch

Rudolph Frischknet, White Sewing Mach. Corp., Cleveland, Ohio
Active, Cleveland Branch

Alfred Dyer Truman, National Brass Co., Grand Rapids, Mich.
Active, Grand Rapids Branch

Abraham Vander Henst, 2245 Avon Ave., S. W., Beverly, Grand Rapids, Mich.
Associate, Grand Rapids Branch

Clarence Robison, 743-47 Ottawa Ave., Grand Rapids, Mich.
Active, Grand Rapids Branch

Milton B. Hammond, 2322 Paris Ave., S. E., Grand Rapids, Mich.
Associate, Grand Rapids Branch

Chester W. Smith, 348 Logan, Grand Rapids, Mich.
Associate, Grand Rapids Branch

John Cole, 941 Dayton St., S. W., Grand Rapids, Mich.
Active, Grand Rapids Branch

John Edward Manning, 1270 Cass Ave., S. E., Grand Rapids, Mich.
Active, Grand Rapids Branch

Lawrence H. Seabright, Y.M.C.A., 27 Library St., N. E., Grand Rapids, Mich.
Active, Grand Rapids Branch

Vernon Cobb Burr, 2258 Englewood Drive, Grand Rapids, Mich.
Active, Grand Rapids Branch

APPLICATIONS

William Bresnick, Stuart Ave., Essex, Md.
Active, Baltimore-Washington Branch

Matthew McClure, Sperry Gyroscope Co., Manhattan Bridge Plaza, Brooklyn, N. Y.
Active, New York Branch

Milton Nadel, J. B. Williams Co., 423 38th St., Brooklyn, N. Y.
Active, New York Branch

Joseph B. Kushner, A. Robinson & Sons, 131 Canal St., New York
Associate, New York Branch

A. C. Steel, Philadelphia, Pa. Associate, Philadelphia Branch
Harry Brown, Philadelphia, Pa. Associate, Philadelphia Branch
Joseph Miraski, Philadelphia, Pa. Associate, Philadelphia Branch
G. S. Bergenthal, Philadelphia, Pa. Associate, Philadelphia Branch
H. Writer, Philadelphia, Pa. Associate, Philadelphia Branch

Albert F. Camin, 9405 Wayburn Ave., Detroit, Mich.
Active, Detroit Branch

Emil Gehart, 7738 Foster, Detroit, Mich. Active, Detroit Branch

William H. Jackson, 229 Euclid Ave., Birmingham, Mich.
Associate, Detroit Branch

Claude Lang, Jr., 138 Glendale, Apt. 411, Highland Park, Mich.
Associate, Detroit Branch

H. W. Lipke, 4885 Bedford Rd., Detroit, Mich. Associate, Detroit Branch

Harold B. Mahoney, 5140 Anna Pl., Detroit, Mich. Active, Detroit Branch

Lawrence Mahoney, 5140 Anna Pl., Detroit, Mich. Active, Detroit Branch

Richard C. Mahoney, 5140 Anna Pl., Detroit, Mich. Active, Detroit Branch

C. O. Durbin, 12561 Third Ave., Apt. 114, Highland Pk., Mich.
Associate, Detroit Branch

William M. Phillips, Jr., Beverly Rd., R.F.D. #1, Birmingham, Mich.
Associate, Detroit Branch

J. E. Spencer, 1627 W. Fort St., c/o Harshaw Chemical Co., Detroit, Mich.
Associate, Detroit Branch

E. A. Steeger, 1627 W. Fort St., c/o Harshaw Chemical Co., Detroit, Mich.
Associate, Detroit Branch

TRANSFER

H. Smallman, 2920 Carrol Ave., Chicago, Ill. from Newark Branch to Chicago Branch

REINSTATEMENT

Edward Bauer, Active, Newark Branch.

SUSPENSIONS

Floyd Merritt, Port Crane, N. Y. Binghamton-Elmira Branch

J. H. Van Housen, Binghamton-Elmira Branch

Theodore Frank, 902 42nd St., Brooklyn, N. Y. New York Branch

Walter C. Benkert, formerly of 291 Central Ave., Brooklyn, N. Y., Present address unknown New York Branch

RESIGNATIONS

Edward Sheehan, 3035 W. Wisconsin Avenue, Milwaukee, Wis.
Active, Milwaukee Branch

DECEASED

Mr. R. G. Johnes, F. B. Stevens Co., Detroit, Mich.
Associate, Detroit Branch

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ABSTRACT ASSIGNMENTS

The abstract situation is settling very rapidly into routine with the following definite assignments now working:—

Abrasive Cleaning Methods—F. K. SAVAGE.
Applied Physics—J. T. ROONEY.
Bulletin, The (Coleman & Appleby)—JOHN BROOME, England.
Ceramic Industry—J. T. ROONEY.
Chemical Abstracts of A. C. S.—ERNEST LYONS, Jr.
Chemical & Met. Eng.—D. S. HARTSHORN, Jr.
Comptes Rendus—J. T. ROONEY
Die Metal Waren Industrie, Etc., (Germany)—WALTER MEYER.
Galvano (France)—C. T. THOMAS.
Industria Mechannica (Italy)—CHARLES FAVETTA.
Jour. Electro Dep. Tech. Soc., (England)—N. E. PROMISEL and ABNER BRENNER.
Jour. Ind. & Eng. Chem.—J. F. CALEF.
Mitteilungen Des Forschungsintituts, Etc., (Germany)—N. E. PROMISEL.
Metal Industry (England)—N. E. PROMISEL and ROBERT GOODSELL.
Metal Industry—EDMUND JEVELI and PAUL OLDHAM.
Metal Cleaning and Finishing—ROBERT SIZELOVE and R. M. WAGNER.
Metal Progress—J. F. CALEF.
Metals and Alloys—D. S. HARTSHORN, Jr., and PHIL. RITZENTHALER.
Products Finishing—EDWIN LACY and PHIL. RITZENTHALER.
Revue de Metallurgie (France)—N. E. PROMISEL.
Trans. Electro Chem. Soc.—ERNEST LYONS, Jr.
Trans. Faraday Soc. (England)—ABNER BRENNER.
Trans. A. S. M.—J. F. CALEF.
Zeitschriff Für Metallkonde (Germany)—N. E. PROMISEL.
Zeitschriff Für Elektrochemie, Etc., (Germany)—WALTER MEYER.

The remaining publications to be assigned from individual selection are as follows:

Acta Physics (U. S. S. R.)
Automotive Industry
American Machinist
Aluminum
Bulletin Societie Francais des Electriciens (France)
Chemistry and Industry
Engineering (England)
Iron and Coal Trade Review
Iron Age
Jour. Ins. Metals
Korrosion und Metallschutz
Mill and Factory
Machinery (England)
Modern Machine Shop
Oberfl Achentecnik (Germany)
Product Engineering
Steel
Sheet Metal Industry
Tetso—To Hagane (Japan)

The abstractors not yet heard from are requested to make their selections from the above list and notify this office when they will start work.

Those either not having answered or having assignments in abeyance are:—

HENRY BURNITZKE	A. LARAVIERE
M. R. CALDWELL	GEO. LEMKE
FRED M. CARLSON	P. R. LYONS
C. CLINDININ	GEO. SIMMONS
RENE GRAUER	E. T. SHEEHAN
W. C. GEISSMAN	FRANK A. TRUDEN
W. HUMLOCK	W. J. WISE

Anyone having easy access to the unassigned publications and willing to abstract from them would be favoring the Society by volunteering for this work.

SPEAKERS

The speaker program is also progressing rapidly with over 100 firms and individuals addressed, about half of whom have already replied.

The branch secretaries or Educational Committee chairmen already have photostatic copies of some of these replies in their hands with more to come as rapidly as they are received, so that there still remains sufficient time to lay out a well balanced season's speaker list for those branches not having completed their programs.

The requests to the branch secretaries for speakers' names has been answered by fourteen of the twenty-nine so far, and it is requested the remainder answer in order to complete the picture.

A noticeable lack of practical platers' names is evident in these lists and it is hoped this condition will be remedied as these individuals are those from whom we particularly desire to hear.

As a society we speak about educational activity only in relation to instructing ourselves, neglecting too often the thought that if we desire to survive and serve it is the users of electroplating who must be instructed in our activities until they become conscious of our existence and usefulness to them, when they will in turn be anxious to assist us in our work and demand that their executives in charge of electroplating apply for admission to our ranks, thereby swelling our numbers and adding to our general knowledge.

This is no attempt to belittle our loyal supporters, the manufacturers of equipment and suppliers to the trade, since it is only through them we are enabled to promptly hear of new developments and processes about which we should have immediate information to determine their usefulness in our everyday work and give advance reports thereon to our employees.

Please carry these thoughts in mind until an expression of your own ideas may be written either in these pages or to your Educational Chairman.

FREDERICK FULFORTH

The Abstract Section

FREDERICK FULFORTH, *Chairman, Program and Educational Committee*

Antimony Electrodeposits. *Die Metallwaren-Industrie und Galvano-Technik.* Question No. 2733, 1938 Vol. **36** No. 15, Page 332—Heavy antimony electrodeposits are seldom produced as they are usually merely used for metal coloring in contrast to arsenic which is frequently deposited in heavy coatings. Antimony deposits from chloride solutions are frequently explosive and if scratched, will give off a white smoke with a noticeable evolution of heat. These explosive deposits are characterized by their silver white brilliant color while the non-explosive deposits are mat gray. The explosive nature of antimony deposits is attributed to the halogen content which may be as high as 6%. The deposition of explosive antimony is dependent upon the concentration and temperature of the electrolyte and for example, the antimony will deposit in a non-explosive state when the chloride solution is 10% and the temperature is above 23°C. (73°F.) and from a 21% solution when the temperature is above 50°C. (122°F.). Numerous baths with relatively low efficiency and which give coarse deposits have been recommended in the literature and in recent years the solution recommended by Mathers has been found to be most practical for the deposition of antimony. This solution is composed as follows:

Antimony trioxide	60 g./l.
Hydrofluoric acid 48%	114 g./l.
Aloin	0.25 g./l.
Oil of cloves	0.012 g./l.

A rubber lined or lead lined tank should be used because ceramic materials would be attacked by the fluorides in the solution. The bath operates with almost 100% cathode efficiency at current densities up to 7 Amps/ft^2 and soluble anodes can be used with the bath as they dissolve with high efficiency in this solution. Without addition agents the deposits are coarsely crystalline but with the above mentioned addition agents, the deposits are finely crystalline, smooth and gray. The above mentioned quantities are sufficient for a 12 hour run after which 0.25 grams of aloin must be added.

W. R. MEYER

Magnetic Tests for Plating Thickness. By C. E. RICHARDS, *J. Electrodepositors Tech. Soc.*, vol. **14**, 1938, preprint, 7 pp. An electromagnetic testing device is described for the non-destructive measurement of the thickness of nonmagnetic coatings on steel. It was designed especially for measuring galvanized coatings more than 2 mils thick, and in its present form is not adapted for measuring coatings thinner than 1 mil. The instrument consists

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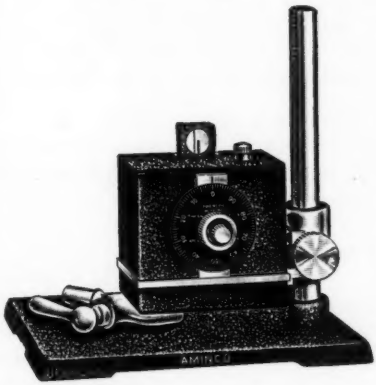

THIS instrument is a magnetic balance by which the attraction of a small permanent magnet to any surface is measured on the graduated dial. The thicknesses corresponding to the dial readings are shown on calibration curves prepared for each instrument by the National Bureau of Standards. Standard thickness samples are supplied to check the calibration occasionally.

●

HAS three distinct applications in measuring coating thickness:

1. **Nickel coatings on non-magnetic base metals such as copper, brass and zinc.**
2. **Non-magnetic Coatings, which may be metallic (copper, zinc, cadmium, tin, lead or chromium), or non-metallic (paint, varnish, lacquer or enamel) on magnetic base metals such as iron or steel.**
3. **Nickel Coatings on iron or steel.**

- **Non-destructive of the coatings or the specimens tested, thus effecting great savings.**
- **Reliable within ± 10%.**
- **Ideal for works control or acceptance testing.**
- **Measurements made rapidly with little experience.**
- **Equally applicable to plane, convex or concave surfaces.**
- **Compact–weighs only 7½ lb.**

Inquiries should state nature of base metal, also type and thickness of coatings to be measured

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of a small electromagnet, the core of which is a straight iron rod. One end of the rod is brought into contact with the coating and the force of attraction is measured by the pull on a spring balance when the magnet is detached from the surface. The percent decrease in the pull, as compared with the pull on bare steel, is a function of the thickness of the coating. Each instrument must be calibrated. However, a single flexible rubber scale can be used for different instruments if two reference points are determined: (1) the reading of the instrument when the magnet is pulled from steel; (2) the reading when the electromagnet is balanced in the absence of magnetic material. The measurements are affected by the size of the objects. Sheet metal smaller than 1.5 in. square requires a special calibration. A. BRENNER

Materials of Construction for Electrodeposition Plant. By A. I. WYNNE-WILLIAMS. *J. Electrodepositors Tech. Soc.*, vol. **14**, 1938, preprint. Steel is the standard construction material, but its poor corrosion resistance is an objection. It must be painted frequently, and when being painted, dislodged dirt and rust may fall into plating tanks. Steel structural units passing through or resting on floors should be surrounded with bitumen compound to protect against spillage on the floors. The conductivity of steel is another objection to its use. Concrete is less satisfactory than steel as regards strength, and it is not very resistant to dilute acids or salt solutions. Concrete floors should always be kept moist so that salts will not crystallize in the pores or else bituminous coverings should be used. Wax may be melted in the pores of other concrete structures. The materials used for tanks and apparatus handling corrosive solutions are: hard rubber, rubber linings, nickel clad steel, stainless steel, lead and special alloys. Wood is still useful for the construction of some tanks. Antimonial lead has given erratic results in contact with corrosive liquors. A Pb-Te alloy is more successful. When Pb is used, a reverse potential which would destroy the PbO_2 film should be guarded against, as this will shorten the life of the equipment. The use of special alloys, such as bronzes, Al-bronzes, cupronickels, ferrosilicons, Ni-Cr-Fe alloys, requires a detailed knowledge of the service conditions. When paint is used as a protective covering, its adherence and freedom from porosity is more important than chemical inertness. It is better applied by brushing than spraying. Sprayed metal is also used as a protective covering. A. BRENNER

A Magnetic Instrument for Measuring the Local Thickness of Coatings. By W. E. HOARE and B. CHALMERS. *J. Electrodepositors Tech. Soc.*, vol. **14**, 1938, preprint, 8 pp. (*Cf. Tech. Publications of the International Tin Research and Development Council*, Series A, No. **66**, 1937). The instrument is used for measuring the thickness of nonmagnetic coatings, especially tin coatings, on steel base metals. It consists of a permanent bar magnet attached to a lever arm. One end of the magnet is brought into contact with the coated steel specimen, and the force required to detach the magnet is determined by siphoning water out of a graduated cylinder which is attached to the lever arm near the magnet. This force depends on the thickness of the coating and is smaller the thicker the coating. The instrument is sensitive to 0.00001 in. of coating, but it must be used under vibration-free conditions. The device can be adapted to the measurement of coatings

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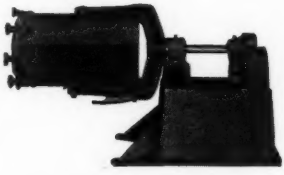

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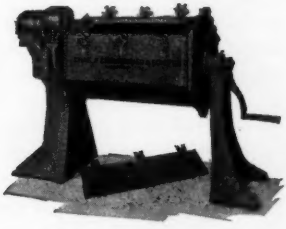

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of different ranges of thickness by shifting counterpoises on the lever arm. Measurements of the thickness of tin coatings were made with this instrument and checked by an interference fringe technique which involves the use of an optical flat having a semi-platinized surface. By these two methods, the profiles of some coatings were determined and considerable differences in thickness were found to exist between two points less than 0.1 in. apart.

A. BRENNER

Two Electromagnetic Instruments for Measuring Coating Thickness. By W. H. TAIT, *J. Electrodepositors Tech. Soc.*, vol. **14**, 1938, preprint, 5 pp. (*Cf.* also *Tech Publications of the International Tin Research and Development Council*, Series A., No. **66**, 1937). (1) The first instrument is used for measuring the thickness of nonmagnetic coatings on steel and was developed especially for measuring tin coatings. It consists of a U-shaped iron core wound with a primary and secondary. The legs of the U are placed on the coated steel specimen which is to be tested. The unit then becomes in effect a transformer in which the magnetic circuit of the U-shaped core is completed, through the coating, by the iron base metal. The efficiency of the transformer, i.e., the output of the secondary, is determined by the thickness of the coating which separates the core from the iron base. The thicker the coating, the smaller is the current in the secondary. The current in the secondary is measured with a rectifier type microammeter. Coatings from 0.00005 to 0.03 in. thick can be measured, but only a part of this range is covered by any one setting of the instrument. Variations in the permeability of the steel base metal are corrected for by setting the instrument to read zero on the bare steel. Measurements can not be made on surfaces having a radius of curvature smaller than 2 in., unless the coatings are very thick. (2) The design of the above device can be changed in some details so as to permit it to measure the thickness of Ni coatings plated on brass or other nonmagnetic base metals. Since Ni is magnetic, the current in the secondary coil of the gage head will be larger, the thicker the Ni coating. This current is directly proportional to the thickness of the coating. A. BRENNER

Adsorbtion, Absorbtion, and Condensation in Recovery of Solvents. By CLAUDE A. BULKELEY, *Chemical and Metallurgical Engineering*. June, 1938, page 430. The author describes the three distinct methods used in the recovery of solvents, viz. adsorbtion, absorbtion, and condensation. Variations, and limitations of each method are described. Included are vapor pressure charts of ninety compounds at varying temperature.

Care of Plating Baths. By A. DARLAY. *Galvano*, May 1938, page 17—**1. Electrolytic Degreasing** — Deficiency in cyanide is the most frequent cause of inadequate degreasing. Use of copper anodes permits control. Appearance of copper deposited on the work, or appearance of black coating on anode indicate need of cyanide addition. Otherwise, add only soda and carbonate of soda. Presence of film-forming impurities in the bath may be detected by staining of copper or brass test pieces after one or two minutes' run. Test of ability of acid rinse to remove these films should be made on these same pieces. Treatment chemically or working bath with large cathode area recommended as remedy. For many uses, the degreasing-

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USE HARSHAW ANODES AND CHEMICALS

ANTIMONY PLATING
Anodes
Antimony Sulphide
Sal Soda

CADMIUM PLATING
Anodes, Electrolytic
Cadmium Carbonate
Cadmium Chloride
Cadmium Hydrate
Cadmium Oxide
Caustic Soda
Sodium Cyanide 96/98%

CHROMIUM PLATING
Anodes, Antimonial Lead
Cerium Carbonate
Cerium Oxide
Chromic Acid (Krome Flake) 99.75%
Chromium Carbonate
Chromium Chloride
Chromium Fluoride
Chromium Hydrate
Chromium Sulphate
Hydrofluoric Acid
Hydrofluosilicic Acid
Iron Chromate
Sodium Fluoride

COPPER BRASS AND BRONZE PLATING
Anodes
Alum, Powdered
Ammonium Muriate
Copper Carbonate
Copper Chloride
Copper Cyanide
Copper Sulphate
Sodium Bicarbonate
Sodium Bisulphite
Sodium Cyanide, 96/98%
Sodium Hyposulphite
Zinc Cyanide

LEAD PLATING
Anodes
Boric Acid
Caustic Acid
Gum Arabic
Hydrofluoric Acid
Lead Acetate
Lead Carbonate
Rosin

NICKEL PLATING
Anodes:
99%, Cast Depolarized
99%, Rolled Depolarized
99%, Cast (carbon) Electronized
95/97%, Cast
90/92%, Cast
Boric Acid
Cadmium Chloride
Cobalt Chloride
Nickel Carbonate
Nickel Chloride
Nickel Fluoride
Nickel Ammonium Sulphate
Nickel Sulphate

SILVER AND GOLD PLATING
Anodes
Gold Chloride
Gold Cyanide
Silver Cyanide
Silver Chloride
Silver Nitrate
Sodium Cyanide
Sodium Gold Cyanide

TIN PLATING
Anodes
Caustic Soda
Sodium Phosphate
Sodium Stannate
Stannous Sulphate
Sulphuric Acid
Tartaric Acid
Tin Chloride
Tin Bath Addition Agent

ZINC PLATING
Anodes
Caustic Soda
Epsom Salts
Rosin
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Sodium Fluoride
Sodium Sulphate
Zinc Carbonate
Zinc Chloride
Zinc Cyanide
Zinc Oxide
Zinc Sulphate

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coppering bath is recommended as more reliable than the simple degreasing bath. C. T. THOMAS.

Care of Plating Baths (Cont'd). By A. DARLAY. *Galvano*, June, 1938, page 20—**Nickel Plating** — In nickel plating, too, the appearance of the anode is significant. A white anode indicates excess acid, a black anode lack of acid, and a brown anode a neutral bath. If the acid condition is not cleared up by addition of ammonia or chlorides, then the anode is passive, due to improper manufacture and should be rejected. If a black coating on the anode persists or returns after addition of acid to the bath, then the bath contains an excess of "exciting salts," or of chlorides either by addition or by carry over from rinses.

Examination of the anodes after a period of rest may also reveal a copper contamination by a red coloration, or an excessive amount of ammonium salts in the bath by the presence of blue-green crystals on their surface.

If these signs fail, recourse must then be made to chemical analysis.

C. T. THOMAS.

Influence of the Surface Condition of the Basis Metal on the Corrosion Protection of Electrodeposits. (Einfluss der Oberflächenbeschaffenheit des Grundwerkstoffes auf den Korrosionsschutz galvanischer Niederschläge). By M. SCHLOETTER and H. SCHMELLENMEIER. *Zeit. für Metallkunde*, Vol. **30**, pages 178-181, May 1938—For further evidence that the degree of corrosion protection afforded by an electrodeposit is not wholly dependent on its thickness, the authors investigate the affect of basis metal surface condition ("roughness") on corrosion protective value of deposit (as indicated by porosity tests). The "roughness" of the surface is obtained and controlled by anodically etching highly polished copper strips in 10% sulphuric acid for varying lengths of time. Quantitative figures for the surface are then obtained by measuring its optical reflectivity in a special apparatus. The porosity is determined by immersing the plated samples for 10 minutes in a solution containing 2% ammonia with 1% ammonium persulfate and then determining the loss of copper through the pores by colorimetric analysis of the solution. Deposits of bright tin (0.000012 in. and 0.000048 in. thick) and bright and dull nickel (0.000004 in. and 0.000008 in. thick) were used.

Experiments showed that the rougher the original basis metal (i.e. the longer it had been etched), the more porous was the plate. This was true for both thicknesses of tin and for the bright nickel. In the case of the dull nickel, the maximum porosity is obtained on pieces even only lightly etched, and remains constant thereafter, i.e. the nickel crystals originally formed continue to develop and no "filling in" of crevices or pores takes place, as is the case with the bright nickel to a certain extent.

The authors conclude that by using bright nickel on a polished basis metal thus securing porous deposits, a saving in metal can be effected, and that to determine the thickness of coating necessary for a certain desired corrosion protection the condition of the basis metal surface must first be considered.

(*Note*: Above thicknesses computed by Abstracter from stated average weight of deposit). N. E. PROMISEL.

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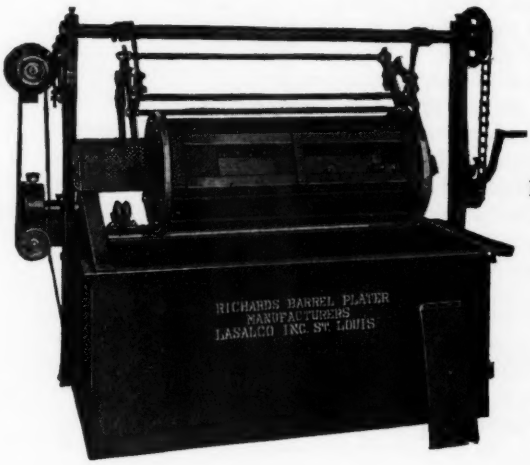

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New Product from Pickling Liquor, *Chemical and Metallurgical Engineering*, August 1938, page 430. Disposition of about 2,000 tons per day has long been a problem of the steel industry. Neutralization with lime has been tried, but hydrolysis slowly returns it to the corrosive stage. Conversion to copperas is being done, but entire world's consumption could be supplied in a few days with the enormous quantity of pickle solution available. H. Seymour Colton at Cleveland has recently perfected a process whereby waste pickling solutions may be transformed into a building and insulating material. The new material has been called Ferron and is largely a coprecipitated iron oxide and calcium sulphate. During its manufacture, it goes through a stage when it is perfectly plastic and can be moulded into any desired shape. Upon setting it is tan in color and extremely porous. Ferron resembles wood but is said to be fireproof, termite-proof and warp-proof. It is similiar to plaster but has 5 times the insulating value. It may be easily sawed and machined. Its inventor claims that it has the same insulating quality as 85% magnesia, but is stronger and will insulate at a higher temperature without loosing its strength. Ferron may be used as a filtering medium and because of its chemical qualities may be used to remove hydrogen sulphide and other sulphur compounds from liquids and gases. The Sharon Steel Corporation was the first of the steel companies to obtain a license for the process. The new plant will produce about 25 tons per day of Ferron.

A Thousand Feet of Continuous Pickling, *Chemical and Metallurgical Engineering*, April, 1938, page 183. On March 15th, the Republic Steel opened its 98 in. continuous strip mill. Each pickling line consists of an uncoiler, a quick operating shear, stitcher, looping pit, pinch rolls, four sulphuric acid tanks, a cold water tank, a hot water tank, drier, additional pinch rolls, shear, and recoilers. Speed of line is 40 lbs.ft./min. Temperature of pickling baths maintained at 180° F. by 10 pyrometers. Acid content averages 8-13%. Pickling tanks are rubber lined steel, lined with bonded brick. An exhauster pulls acid fumes through water spray scrubber and discharges them in open air through rubber-lined stack. Steel moves through mill at speeds up to 25 miles per hour and ends its cycle in bright annealing furnaces.

D. S. HARTSHORN, JR.

How to Reduce Plating Department Costs, *Chemical and Metallurgical Engineering*. December, 1937, by E. D. CLANCY. In a plant which the author describes, two motor generator sets directly coupled and driven by 60 H.P. synchronous motors were responsible for abnormal maintenance costs on the motor fields because:

1. The motor fields had been revamped by shimming out the poles to decrease the air gap.

2. The excitation was being maintained at 50% above normal.

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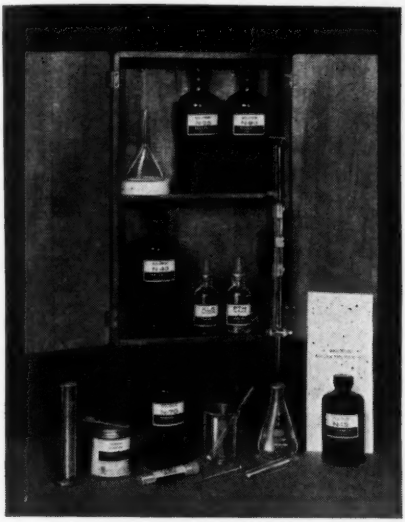

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3. The revamping resulted in a considerable increase in power factor corrective effect of the motors.

4. Resulting changes made it necessary to run seven days a week, 24 hours a day to produce sufficient reactive k.v.a. hours to avoid a power factor penalty even though the productive period was eight hours a day for five days a week. From established figures it was determined that 55 k.v.a. of capacitors operating 24 hours a day would produce an equivalent or greater number of leading reactive k.v.a. hours than the synchronous motors were delivering during idle or non-productive period. Installation resulted in an energy savings of $829.06 per year over the old method plus a considerable savings in maintenance costs.

METALS AND ALLOYS

PHIL J. RITZENTHALER

1. Harmful Finger Prints on Metals to be Finished. By LOUIS NAGEL, "*Industrial Finishing*", Dec. 1937, pp. 62-3. Practical discussion of effect of finger prints on metal finishes. In some cases, finger prints not only stained metal, but etched it and caused coating failure. Discusses method of eliminating it.

2. Stripping Chrome Deposits for Thickness Measurement. By S. G. CLARKE (Research Dept., Woolwich, Eng.). "*J. Electrodepositors Technical Society*", Vol. **14**, Jan., 1938. Preprint, 7 pp. Original research. Thickness is measured by noting time of gassing when chrome deposit is treated with a reagent composed of HCl (sp. gr. 1.16) and 20 g/l Sb_2O_3. Specimen is either immersed in reagent, or reagent is placed in a ring glued to surface of specimen. Each .00001" of chrome requires 10 sec. for solution at 20°C. (68°F.). Rate of solution is affected considerably by temperature. Results are correct to 25%.

3. Aging of Plating Baths. By A. POLLACK, "*Oberflachentech*", Vol. **15**, Mar. 1, 1938. Research. Aging of plating baths is the condition whereby good deposits are obtained only after some use. Artificial aging is done by electrolyzing baths. Chromium baths are stated to be better when aged, although American experience questions this. One effect of aging chrome baths is reduction in sensitivity to impurities.

Nickel baths, especially those containing organic additions, show similar aging properties. Baths with citric acid give in course of time, lighter and finer grained deposits. Old nickel baths show reduced sensitivity to acid and alkali additions. Aging of cadmium-containing bright nickel baths is done to remove excess cadmium. Artificial aging of silver baths is seldom done, as carbonate accumulation helps good deposition. This is true also of brass and cyanide copper baths. Acid copper baths age by absorbing small amounts of organic agents. An excess of these agents tends to make deposits brittle.

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PRODUCT FINISHING

1. Barrel Finishing of Metal Products. By H. LEROY BEAVER, "*Product Finishing*", Aug., 1938, pp. 10-20. Discusses contract barrel burnishing of table silverware by plating shops, as a maintenance service. Said to be good field for job shops. Discusses several sizes of barrel for this. Smaller size is 8 inches in diameter and 12 inches long and will handle both flatware and small hollow ware. In larger types a screen is included to allow quick separation of burnishing material from work. End loading types have greater capacity than one-third lid opening barrel types. Speed of rotation varies from 18 RPM for hollow ware to 24 RPM for flatware. Loads of burnishing material are—8" x 12" type—62 lbs., 8" x 24"—124 lbs. This will fill barrel about 2/3 full. Big advantage of cleaning silverware by burnishing over hand methods is the work hardening of silver in burnishing, with resultant longer life, no loss of silver and better luster.

PHIL J. RITZENTHALER

Galvanoplastic Reproductions from Metal Moulds by GEORGE SCHOR, *Metal Industry*, Vol. **36**, page 418, Sept., 1938. The process of reproducing objects by use of metal moulds is applicable to many fields of endeavor. The author possessing full knowledge of the art of galvanoplasticity and reproduction by metal moulds describes in full detail the necessary materials, equipment, type of solutions, resists cur,/den. used in plating for the reproduction of grilles, lighting fixtures, patterns, phonograph records and other products. PAUL A. OLDAM

Getting the Most Out of Your Lacquer, by W. T. SMITH, *Metal Industry*, Vol. **36**, page 430 Sept. 1938. A very interesting article relating to the purchasing of lacquers and thinners is mentioned to aid in the control of the viscosity. A factor most important to the lacquer finisher. Other vital pointers such as temperature of the storage space for the lacquer and thinner and the temperature of the lacquer upon its application to the article to be lacquered is also given, with effect on article caused by varied temperature of the lacquer. PAUL A. OLDAM

The Cost of Nickel Plating, by Joseph Haas, *Metal Industry*, Vol. **36**, page 422, Sept., 1938. An illustration is given regarding the cost of nickle deposits of 0.001" thickness and that of 0.0001" thickness as applied to plumbing fixtures in working to given specifications. PAUL A. OLDAM

NEW PATENTS—478,916, **"Coating with Metals".** *The Metal Industry*, London, England. Volume **LIII**, No. **4**. July 22, 1938. Surface layers of the metals of the platinum group, e.g., rhodium, are produced by heating, in a vacuum of at least 10^{3} mm., e.g., 10-^{4} of mercury, the metals in the form of structures, e.g., strips, of large surface area per unit volume, and the subliming metal is condensed on work materials arranged in the vicinity of these strips, etc. The work, which may be of glass, quartz, ceramic materials, minerals,

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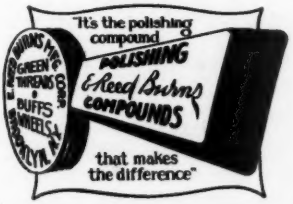

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such as asbestos, or inorganic or organic substances is cleaned before treatment, and the metal is clamped at the two narrow edges in copper jaws and heated to a temperature below the melting point by direct electrical heating. The surface area of the strip, etc., may be equal to or smaller or larger than that of the work, if smaller a uniform coating is ensured by moving, e.g., rotating, the strip, etc., or the work. The resulting surface is consolidated by an after treatment such as rubbing with polishing leather or cotton wool impregnated with lubricant. The process may be used to produce weatherproof mirrors and surface layers which are partly permeable to light.

ROBERT B. GOODSELL

Cleaning and Electro-Plating of Zinc Alloy Die Castings. By E. C. RINKER. *Products Finishing*, August, 1938. The importance of proper care and thorough cleaning of zinc alloy die castings prior to electroplating is clearly shown in this article. Details of procedure for cleaning, acid dips and formulae for copper and nickel plating solutions are given, and there is a discussion of the various factors involved.

Barrel Finishing Metal Products. By H. L. BEAVER. *Products Finishing*, August, 1938. This article is part three of the sixteenth article of this series, and deals with methods for the barrel finishing of silver and silver plated wares, types of barrels, and operating technique. For those interested in the maintenance of tableware for hotels, clubs, etc., complete details of procedure and equipment necessary are given.

Platers' Cleaning Compounds. By PROF. E. K. STRACHAN. *Products Finishing*, August, 1938. Gives an excellent digest of the four physicochemical principles involved in cleaning. Saponification, emulsification, wetting and deflocculation are defined and clarified so as to make them easily understood. Close attention to these principles would eliminate many of the platers' cleaning troubles.

Application of Plate Type Copper Oxide Rectifier. By C. E. BERGER. *Products Finishing*, August, 1938. A new type of copper oxide rectifier is described. Intended for those manufacturers who require a source of low potential direct current for electrochemical processes at 6 volts or less and who need sizeable volumes of current. This type is said to compare very favorably with the motor generator set. The process of rectification is described in some detail, and the advantages of the plate type rectifier are given. It is said to have a high efficiency and a power factor of approximately 95%.

Testing the Modern Finish. By R. C. MARTIN. *Products Finishing*, August, 1938. Comparison is made of methods of mechanical weathering and outdoor exposure tests for modern finishes. A device known as the Weather-O-Meter is described, and with this equipment reactions to sun, rain, cold and heat may be visualized in accelerated fashion and comparative resistance to weathering easily evaluated.

The BUYERS' GUIDE—Continued

Equipment—Continued

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F. Gumm Chem. Co., Inc., Kearny, N. J.
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Divine Bros. Co., Utica, N. Y.
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Belke Mfg. Co., Chicago, Ill.
J. J. Siefen, Detroit, Mich.

Polishing Wheel Cement

The Udylite Co., Detroit, Mich.
Harrison & Company, Haverhill, Mass.

Polishing Wheels and Materials

Hanson-Van Winkle-Munning Co.
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Matchless Metal Polish Co., Glen Ridge, N. J. and Chicago, Ill.
The Udylite Co., Detroit, Mich.
F. Gumm Chem. Co., Inc., Kearny, N.J.
Bruce Products Corp., Detroit, Mich.
E. Reed Burns, Brooklyn, N. Y.
Divine Bros. Co., Utica, N. Y.

Rouges

Harrison & Co., Haverhill, Mass.
Hanson-Van Winkle-Munning Co.

Rubber Lined Tanks

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Soaps

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F. Gumm Chem. Co., Inc., Kearny, N. J.
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Testing Instruments

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Kocour Co., 4720 S. Christiana Ave., Chicago, Ill.
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Storts Welding Co., Inc., Meriden, Conn.

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INSPECTION OF EXPOSURE TESTS OF PLATING, PRINCIPALLY ON NONFERROUS METALS

I. SCHEDULE OF INSPECTIONS

(a) **Pittsburgh, Pa., at Bureau of Mines Experiment Station.** 4800 Forbes St. Notify S. E. Hedden, 227 Fifth St., Aspinwall, Pa. New tests started June 24, 1938. Inspection at 9:30 A.M. on Wednesdays, September 14 and November 16, 1938; and February 15, 1939.

(b) **State College, Pennsylvania.** Notify G. C. Chandlee, Chemistry Department, State College, Pa. New tests started June 21, 1938. Inspection at 9:30 A.M. on Thursdays, September 15th and November 17, 1938; and Feb. 16, 1939.

(c) **New York City, New York.** Notify C. H. Sample, 463 West St., New York City. New tests started June 30, 1938. Inspection at 9:30 A.M. on Fridays, September 16 and November 18, 1938; and Feb. 17, 1939. (September 16—Research Com., New York).

(d) **Sandy Hook, New Jersey.** Notify C. H. Sample, 463 West St., New York City. New tests started June 28, 1938. Inspection at 9:30 A.M. on Saturdays. September 17 and November 19, 1938; and Feb. 18, 1939.

(e) **Washington, D. C.** Notify W. Blum, National Bureau of Standards, Washington, D. C. New tests started July 6, 1938. Inspection at 9:30 A.M. on Mondays, September 19 and November 21, 1938; and Feb. 20, 1939.

(f) **Key West, Florida.** Notify L. M. Pierce, U.S. Naval Station, Key West, Fla. New tests started about August 1, 1938. Inspection on Wednesdays at 9:30 A.M., September 21 and November 30, 1938; and Feb. 8, 1939.

II. PARTICIPATION IN INSPECTIONS

The above schedules have been arranged so that it is possible for a person who so desires, to participate in inspections in the four northern locations during one week. In order to facilitate arrangements, and especially the use of automobiles, both locally and between cities, those planning to take part are requested to notify the persons designated, if possible about one week in advance. They will then be advised of any changes in the schedules.

The inspections are open to all interested persons. It is hoped that each member of the Research Committee and of the Joint Committee will make special efforts to attend these inspections. Detailed instructions will be furnished to those taking part. There is no objection to discussing the observations with other persons, but premature conclusions should not be drawn and no published references should be made except with the approval of the Joint Committee.

PLATERS' OUTING AT BETHLEHEM, CONN.

Bob Leather, President of the Lea Manufacturing Co., Waterbury, Conn., invites all platers to attend the Fall Outing at his home Leacrest on Saturday, October 1, 1938. This is an ideal spot for the platers to get together.

Nestled amongst the beautiful Connecticut hills, Leacrest and the surrounding country is glorious in its autumn foliage.

Come and enjoy the scenery, the fun, the refreshments, and above all, the good fellowship.

This event gets bigger and better every year.